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<p>(54) Title: ELECTRONIC BILL PAY SYSTEM</p> <p>(57) Abstract</p> <p>A bill pay system (figure 4) wherein participating consumers (12) pay bills (30) to participating billers (14) through a payment network (102) operating according to preset rules (104). The participating consumers (12) receive bills (3) from participating billers (14) (paper/mail bills, e-mail notices, implied bills for automatic debts) which indicate an amount, and a unique biller identification number (120). To authorize a remittance, a consumer (12) transmits (2) to its participating bank (16) a bill pay order (122) indicating a payment date, a payment amount, the consumer's account number with the biller (14), a source of funds (232) and the biller's (14) biller identification number, either directly or by reference to static data containing those data elements. Bank C (16) then submits a payment message (124) to a payment network (102), and the payment network (102), which assigns the biller reference numbers, forwards (268) the payment message to the biller's bank (18). For settlement, the consumer's bank (16) debits the consumer's (12) account and is obligated to a net position with the payment network (102); likewise, the biller's bank (18) receives a net position from the payment network (102) and credits the biller's bank account (268). If the consumer's bank (16) agrees to send non-reversible payment messages (124), the consumer's bank (16) does not submit the transaction until funds are good unless the consumer's bank (16) is willing to take the risk of loss if funds are not good, in the case of a guaranteed payment network (102).</p>			

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ELECTRONIC BILL PAY SYSTEM

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## BACKGROUND OF THE INVENTION

The present invention relates to the field of electronic bill payment systems ("bill pay") which allow a consumer to direct their bank, an agent of their bank, or a non-bank bill pay service bureau to pay amounts owed to merchants, service providers and other billers who bill consumers for amounts owed.

Millions of consumers make payments to utilities, merchants and service providers ("billers") by check, with a small number of consumers using non-check means for paying billers. The term "consumer" as used herein broadly refers to any person or entity paying a bill, be it a utility customer, a taxpayer paying a tax, a borrower repaying a loan, etc., which could be a person or a business entity. Consumers are differentiated from "customers" herein because that term could potentially refer to many parties to a bill pay system, in that the biller is a customer of its bank (the "biller bank"), the consumer is a customer of its bank (the "consumer bank"), and consumer might be a customer of a non-bank bill pay service bureau. The consumer is also usually a customer of the biller. To avoid confusion, the bill paying entity is referred to as the "consumer" and the "biller" is the entity which is to be paid.

Billers, who often are billing small amounts with each transaction, must incur the costs of processing many checks, including the attendant overhead of dealing with remittance processing, such as opening envelopes, data capture of the consumer's account number, MICR (Magnetic Ink Character Recognition) encoding of the check amounts, etc. To ensure that the cost of processing an item is small, billers have set up huge operations for remittance processing, often out-sourcing the work to "lockbox" operations which process and deposit the payments for the biller, supplying the biller

with captured consumer data and MICR encoded checks for deposit. The payment coupons which a biller requests to be returned with the consumer's check are often preprinted with scanlines comprising lines of data (account number, amount due, etc.) which can be electronically captured due to the design and placement of the scanlines on the coupon. For example, the necessary information may be provided on the coupon in a bar code, or other mechanically or electronically readable form. Because of this, coupons play a key role in today's remittance processing systems.

Given the economies of scale, a biller has great incentive to reduce the cost of remittance processing and, more significantly, the biller has an even larger incentive to reduce the cost of "exception items." An exception item is a payment which, for some reason, cannot be processed according to the highly automated procedures put in place by the biller to quickly process remittances. Exception items include checks received without payment coupons, payment coupons received without checks, checks for amounts different than the amounts shown on the corresponding coupons, multiple payment coupons received in an envelope with a single check. The cost to process a typical payment transaction is \$0.09 to \$0.18 per transaction for a high-volume, efficient remittance processing operation, while an exception item transaction might cost as much as \$0.65 to 1.50.

Curiously, when a consumer decides to try an alternate form of remittance such as using a bill pay service bureau, either a bank or non-bank service bureau, the cost to the biller increases dramatically, because such a remittance is typically an exception item to most billers today. A bill pay service bureau provides a bill pay service to the consumer whereby the consumer directs the service bureau to make payments to the biller. Since the payment origination is usually done electronically, the remittance is not presented to the biller in the usual way, which is just a check and a payment coupon, in the biller-provided envelope. Instead, the biller usually receives a check printed by the service bureau drawn on the consumer's bank account and showing the

consumer's account number with the biller and MICR data encoding the consumer's bank account number. In some cases, the service bureau obtains the funds from the consumer, and then presents the biller with a check drawn on the service 5 bureau's account with instructions to credit the amount of the check to the consumer's account with the biller. In other cases, the payment is an electronic transfer where the consumer's account information is included with the transfer or provided in a list of payments from multiple consumers 10 provided by the service bureau to the biller.

In any case, these transactions are exception items to the biller, since no payment coupon is presented, and thus entail additional costs to billers. Unfortunately for the billers, electronic payments and the use of service bureaus 15 will increase in popularity, causing the percentage of exception items to increase, unless a "non-exception" mechanism for efficiently handling electronic payments without payment coupons is used. The costs to the consumer's bank, if it is not the bill pay service provider, or it is not in 20 cooperation with the service bureau, increase also, since it must modify its check presentment and clearing process to accommodate these unusual transaction which are being forced upon the bank.

With large bill pay service bureaus, which may have 25 many customers of their service paying bills to the same biller, that biller will often receive one check for many customers accompanied by a list of account numbers and amounts for the consumers whose remittances are part of the single check. The biller then must go through the list manually to 30 verify that the account numbers are correct, and then capture the data to their accounting systems. Thus, if more and more consumers start using this alternative payment means, the percentage of remittances which are exceptions will go up, raising the average cost per transaction.

35 Many proposed bill pay systems are designed with little or no consideration of the costs to parties other than the consumer and the bill pay system operator. For example, U.S. Patent No. 5,220,501, issued to Lawlor, et al., describes

in detail a bill pay system in which the bill pay system operator captures consumer payment directives using a telephone with a small text display. These consumer payment directives are sent to a central computer operated by the 5 system, which then uses an ATM network to obtain funds in the amount of the payment from the consumer's ATM-accessible bank account. Once the funds are obtained into an account of the system operator, the system determines how to pay the biller, either by wire transfer, debit network using the biller's bank 10 account number, or by check and list. While the Lawlor et al. system is presented as being very beneficial to the system operator (i.e., the service provider of bill pay services to the consumer), it has less than desirable effects on the consumers, the consumers' banks, and the billers.

15 With the Lawlor et al system, consumers run the risk of loss if the system operator were to go out of business between the time a withdrawal is made and the payment is made to the biller. The consumers also cannot pay a bill to a one-time vendor easily, since the system is only set up to pay 20 billers which the consumer has previously identified days or weeks before a payment to a biller is ordered. There are two reasons for this. First, the Lawlor et al. device for consumer data entry is geared to users who require simple devices and because a keyboard for entry of biller data to 25 enroll a biller would be too complicated. Instead, the consumers submit forms to the system operator identifying the biller, probably by name and address. This identification is inexact, because the system operator might identify the wrong biller, and billers might operate under similar names with 30 similar addresses.

Billers dislike systems such as Lawlor's because each transaction through the system is an exception item to the billers, and if a service bureau makes a mistake, the biller will often find itself fielding the call from consumers 35 when they call to complain about misapplied payments. Billers could try to add a service charge to cover the added expense, in much the same way that mail-order companies charge less for prepayment and retail outlets charge less for using cash, but

the problem is that the billers do not know which remittances will come in normally and which remittances will come in via a bill pay service. What is needed is a simple means of shifting the costs of the exception items to the consumers, or 5 lowering the costs of the transactions. That way, if the consumer insists on being an exception item, the biller can recover their costs, and the interests of both the consumer and biller are served.

Several other solutions to the high cost of 10 exception items have been proposed, such as billers getting pre-authorization from consumers to submit debit requests to consumer's bank, or a service which specializes in processing exception items into a form processable by the biller's automated remittance processing system or lockbox. These, 15 however, have not been satisfactory solutions. The former solution provides very little control by the consumer over the withdrawal of funds from its bank account and is only really useful for recurring payments from a particular consumer to a particular biller, while the latter adds an additional cost 20 (albeit usually less than the exception processing costs) over and above the normal remittance processing cost. In some cases, for small recurring payments, the only way a biller's goods or services is offered to a consumer is through pre-authorized debits.

25 Several bill pay or remittance processing systems ↓ proposed in the prior art are described below, but first some background on bill pay is provided. For brevity and clarity, the consumer's account with the biller is referred to herein as the C-B ("consumer-biller") account, thereby distinguishing 30 that account from other accounts: the consumer's account with its bank, the biller's account with its bank, etc. In most cases, the biller uses the C-B account number to uniquely identify the consumer in its records.

Bill pay transactions, however accomplished, have 35 several common elements, which are either explicit or can be implied by the nature of the transaction. The first is presentment: a biller presents the consumer with a bill showing the C-B account number and an amount due. The second

common element is payment authorization: the consumer performs some act (e.g., signs a check or other negotiable instrument) which authorizes the consumer's bank to transfer funds from the consumer's account to the biller; this element might occur 5 after presentment or before (as in the case of pre-authorized withdrawals), and need not be explicit (delivery of a check is implicit authorization for the amount of the check). This element is almost always accompanied by some action by the consumer bank to ensure payment to it from the consumer, such 10 as withdrawing the funds from consumer's bank account, posting the amount to the consumer's credit card account or line of credit, etc. The third common element is confirmation to the consumer of the funds withdrawal. The fourth common element is the crediting of the payment to the C-B account. In some 15 cases, the biller acknowledges the crediting with nothing more than refraining from sending a past due bill.

Figs. 1-3 show block diagrams of existing bill pay systems which implement these four common elements in different ways. In those block diagrams, the participants are 20 shown in ovals, and the flow of material is shown by numbered arrows roughly indicating the chronological order in which the flows normally occur. The arrows embody a link, which is a physical link for paper flow, an data communications channel from one point to another, or other means for transferring 25 material. Where several alternatives exist for a flow, the alternatives might be shown with a common number and a letter appended thereto, such as "2" and "2A". "Material" refers to documents and/or information, whether paper-based ("postal mail"), electronic (e-mail, messages, packets, etc.), or other 30 transfer medium. In most cases, the material which is flowing is shown near the arrow which links the material's source and destination.

Fig. 1 is a block diagram of a conventional paper bill pay system 10, wherein billers send paper bills or coupon books to consumers and consumers return paper checks and payment coupons. Because the majority of today's bill pay 35 transactions occur this way, the proof and capture process for

these remittances is highly automated, except for the aptly-named "exception items."

In bill pay system 10, the participants are a consumer C (12), a biller B (14), consumer C's bank (Bank C) 16, biller B's bank (Bank B) 18 and, optionally, a lockbox operator 20. Bank C maintains consumer C's bank account 22 and a clearing account 24, while Bank B maintains biller B's bank account 26 and a clearing account 28. The material passing between the participants includes a bill 30, a remittance 32 comprising a check 34 and a payment coupon 36, an account statement 38, an accounts receivable ("A/R") data file 40, an encoded check, which is check 34 with MICR encoding, and possibly a non-sufficient funds ("NSF") notice 46.

The flow of material between participants in bill pay system 10 begins (arrow 1) when biller B sends bill 30 through the postal mails to consumer C. Bill 30 indicates a C-B account number and an amount due, and is typically divided into an invoice portion to be retained by consumer C and a payment coupon portion to be returned, each of which shows the C-B account number and amount due.

In response to receiving bill 30, consumer C sends remittance 32 to biller B (arrow 2). Remittance 32 contains check 34 drawn on consumer C's account 22 at Bank C and payment coupon 36, preferably included in the return envelope provided by biller B. Biller B then MICR encodes the amount of the remittance onto check 34 to create encoded check 44, and deposits check 44 (arrow 3), and credits consumer C's account in biller B's customer general ledger ("G/L") account database 42. Alternately, remittance 32 is mailed to lockbox operator 20 (arrow 2A), which opens remittance 32, MICR encodes check 34 to create encoded check 44, captures the C-B account number and amount of the check electronically to create A/R data file 40. Lockbox operator 20 then sends A/R data file 40 to biller B, and sends encoded check 44 to Bank B to be credited to biller B's account 26 (arrow 3A). Because check 44 is signed by consumer C, it authorizes Bank C to pass the amount of the check to Bank B after Bank B presents the

check to Bank C. The signed check serves as the second common element of a bill pay transaction: authorization.

However encoded check 44 reaches Bank B, Bank B then presents check 44 to Bank C, along with other checks received by Bank B which were drawn on Bank C accounts (arrow 4). When Bank C receives check 44, it withdraws the amount of the check from C's account 22 and passes the funds to B's account at Bank B (arrow 5). Actually, this funds transfer occurs from C's account 22 to clearing account 24, to clearing account 28, and then to B's account 26, possibly with one or more intermediate settlement banks in the chain (omitted for clarity).

If the funds are not available in C's account 22 to cover the amount of check 44 or if C's account 22 has been closed, then Bank C will return the check to Bank B, who will in turn return the check to biller B. Biller B will then have to reverse the transaction crediting consumer C's C-B account in G/L database 42 and renegotiate payment from consumer C, all at significant cost to biller B. Even if check 44 clears, the process of providing good funds to biller B is not instantaneous, since check 44 must physically travel from biller B to Bank B to Bank C. Of course, if biller B has sufficient credit rating with Bank B, Bank B could move the funds from clearing account 28 to B's account 26 when Bank B receives check 44.

At some time following the clearing of check 44, biller B also updates its A/R records in G/L database 42 to credit consumer C's C-B account, and Bank C confirms to consumer C the withdrawal of the amount of check 44 by listing it on statement 38 and/or by the return of cancelled check 44. If the check doesn't clear, then biller B and other parties to the transaction unwind the payment.

One benefit of bill pay system 10 is that, for nearly all billers, there is no need for biller enrollment (any consumer can pay a biller without prior arrangements or a waiting period). However, many drawbacks of bill pay system 10 are apparent. Consumer C must individually address, mail and track payments to individual billers such as biller B.

Bill pay system 10 must reach arrow 4 before funds availability is confirmed. If the funds cannot be confirmed, the progress of the transaction must be reversed, with costs to Bank C, Bank B and biller B. In such a system, consumer C 5 does not have control over when the funds are transferred, because the transfer timing depends on when biller B receives and processes remittance 32 and when Bank B receives check 44 from biller B.

A variation on the above system is the GIRO systems 10 used in several countries in Northern Europe. The GIRO systems were set up there either by the government or the postal system, which is a traditional supplier of financial services. In a GIRO system, it is mandated that each bill payer and each bill payee be assigned a GIRO number. The 15 biller sends bills with its biller GIRO number on the payment coupons. The layout, shape, etc. of the GIRO payment coupons is also mandated, so a consumer will receive similar coupons with each bill. After reviewing the bill, the consumer simply adds their GIRO number to the payment coupon and signs it. 20 Thus, the payment coupon also serves as a banking instrument similar to a check.

The consumers in a GIRO system are comfortable with it because the payment coupons all look the same. The consumer then mails the payment coupons to either a GIRO 25 central processor or its own bank, which then sorts them by biller GIRO number and submits them to the biller. Since the payment coupons are all in a fixed format, they can be easily encoded in a machine readable format, including the payment amount, which the biller pre-prints onto the coupon. If the consumer gives their GIRO number to the biller, the biller can 30 also pre-print that number on the payment coupon as well. Since all the coupons look the same, the banks can process them like a check and achieve economies of scale.

While a GIRO system might be a partial solution to 35 efficient remittance processing, it does not go far enough. Furthermore, in the U.S., it is not suitable, since there are many more billers in the U.S. to coordinate compared with the relatively few billers in Northern Europe which would need to

be coordinated. Coordination of billers and getting them all to standardize on a fixed format for bills, even for a few billers is easier in those countries, since the governments there typically take a more active role in payment systems.

5 Also, consumers in the U.S. are less likely to need such a system, because checking accounts are more readily available to consumers in the U.S.

As for the billers, they still have the problems of bill pay system 10, albeit with less of a problem with missing checks or coupons, because the check is the coupon. The biller still must contend with the paper shuffling, checks that do not clear, etc. Also, because the system is funded by float on the funds, there is less of a concern among the parties involved in bill pay to try and balance their costs with other parties. In the U.S., however, one day's float may be an unacceptable cost to the participants in the bill pay system, and it does not allow for competitive rates. A consumer's bank or a biller's bank has no incentive to be more efficient so that it can charge less than another bank and thus compete for a larger market share, since banks do not charge for the GIRO services and have no power to reduce the costs to the participants, nor shift them to the best cost absorber.

Fig. 2 is a block diagram of an alternate bill pay system 50, which reduces the effort required on the part of consumer C relative to bill pay system 10, but which increases costs for billers. The difference between bill pay system 50 and bill pay system 10 is that consumer C initiates payment electronically (or by other non-check means).

Bill pay system 50 includes most of the same participants as bill pay system 10: consumer C, Bank C, Bank B, possibly a lockbox operator (not shown in Fig. 2), and biller B, who is typically not a proactive or willing participant in this system. Additionally, a service bureau S (52) and a Bank S (53) are participants, with service bureau S maintaining a service database 54 which is used to match bill payment orders with billers. The material passing among the participants includes bill 30, as in the prior example, as

well as a bill payment order 56 and related confirmation of receipt 66 (both typically transmitted electronically), an enrollment package 57, a biller confirmation 58, a bill payment 60 ("check and list") which includes check 62.

5 In bill pay system 50, consumer C enrolls in bill pay system 50 by sending service bureau S (arrow 1) enrollment package 57 comprising a voided check and list of billers to be paid by S on behalf of C. S subsequently sends biller B biller confirmation 58 (arrow 2) to verify (arrow 3) that C is  
10 indeed a customer of B.

With bill pay system 10 (Fig. 1), consumer C identifies the proper biller by the remittance envelope and the payment coupon, neither of which is available to service bureau S in bill pay system 50. Thus, service bureau S must  
15 identify the correct biller for each bill payment order some other way. Typically, service bureau S does this by asking consumer C for biller B's name, address, telephone number and consumer C's account number with biller B ("C-B account number"). Since neither Bank C nor service bureau S may have  
20 any account relationship with biller B, they must rely upon consumer C's accuracy in preparing enrollment package 57 which is used to put biller B's information into service database 54. Service bureau S typically requires this information only once, during biller enrollment, storing it to service database  
25 54 for use with subsequent payments directed to the same billers. Of course, if this information changes, service database 54 would be out of date. If this information is wrong to start with, or becomes wrong after a change, service bureau S might send funds to the wrong entity. What a service  
30 bureau will often do to reduce errors in biller identification is to not allow the consumer to make payments to a biller for a specified time period after enrolling the biller, to allow service bureau S to verify biller B and the C-B account structure with biller B in a biller confirmation message 58.

35 Sometime later, consumer C receives bill 30 (arrow 4) and initiates bill payment order 56 (arrow 5). Bill payment order 56 includes authorization for service bureau S to withdraw funds from C's account 22 to pay bill 30, the

amount to pay (not necessarily the amount due on bill 30), the date on which to pay, and some indication of biller B as the payee. Service bureau S responds with confirmation of receipt 66 indicating that bill pay order 56 was received (arrow 6).

5 Consumer C can send bill pay order 56 in any number of ways, such as using a personal computer and modem, directly or through a packet of other data network, via an automatic teller machine (ATM), video touch screen, a screen phone, or telephone Touch-Tone™ pad (TTP) interacting with a voice  
10 response unit (VRU). However this is done, service bureau S receives one or more bill pay orders from consumer C. These orders could be instructions to pay some amount for a bill or a set amount of money at periodic intervals.

Assuming that service bureau S has correctly  
15 identified and confirmed that biller B is a biller which consumer C desired to pay with bill pay order 56, then service bureau S passes the funds to biller B as biller payment 60 (arrow 12) after securing funds to cover the remittance. Bill payment can take several forms as discussed below. In Fig. 2  
20 a "check and list" is depicted, which is common in the art. A check and list comprises a single payment, check 62 drawn on service bureau S's account 70, accompanied by a list of all consumers whose individual remittances are aggregated in the single check. The list shows C-B account numbers and payment  
25 amounts for each consumer included on the list which should total to the amount of the single check 62. This process brings some economies of scale to service bureau S, although at additional expense to biller B. In some cases, rather than endure the expense of checking over the list to ensure it  
30 matches the check amount, biller B will refuse to accept that form of payment.

To secure funds, service bureau S clears check 44 through Bank S 53 drawn on C's account 22 at Bank C (arrows 7-11). S then sends payment 60 to biller B (arrow 12).  
35 Biller B must treat payment 60 as an exception item, posting G/L database 42 from the list instead of payment coupons as in bill pay system 10. Biller B deposits check 62 with Bank B (arrow 13) who clears it through Bank S and a settlement

account 71 to obtain good funds for B's account 26 (arrows 14-17). The cycle is completed (arrow 18) when consumer C receives notice that funds were withdrawn from C's account 22 for the amount entered in bill pay order 56.

5 If the bill pay transaction goes through, Bank C will confirm that it went through by sending a confirmation (typically statement 38) to consumer C. However, the transaction might have to be sent back for a number of reasons. If the service bureau S cannot identify biller B from information provided by consumer C, it will reverse the transaction. If biller B is misidentified, or the C-B account number provided by service bureau S is not valid, the transaction will be reversed after arrow 12, at considerable confusion to consumer C and service bureau S, and cost to  
10 biller B. In some cases, biller B will not make the effort to reverse the transaction, instead holding onto the funds until consumer C asks for them back. Furthermore, if the funds are not good, additional costs are imposed on biller B, and the possibility exists that consumer C will lose money if the  
15 funds pass through service bureau S, and S subsequently goes out of business before transferring the funds to biller B.  
20

Bill pay system 50 has further drawbacks. For example, authorization for withdrawals from C's account 22 are made by C either at time of payment or in advance, for future payments. To allow time for service bureau S to process requests, they will often require a window of several days in which they agree to process the payment. Because of this, consumer C is asked to leave good funds in account 22 for the duration of this period.

30 Another problem with bill pay system 50 is that service bureau S must figure out which payment method to use with which billers. The check and list approach might not be workable with biller B, either because biller B refuses to be burdened with it or for other reasons. The bill payment process just described is essentially a series of bilateral agreements between a party and the next party in the payment process, with no agreements from end to end, so there is no guarantee that any arrangement between two parties such as  
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service bureau S and biller B will be effective at reliably and inexpensively transferring funds from the consumer to the biller. For example, consumer C might have an agreement with service bureau S, but service bureau S and Bank C might still 5 be strangers to each other. Service bureau S and Bank C are generally always strangers to biller B, which is why there needs to be so many different paths to biller B.

Consumer C in bill pay system 50 must also contend with one confirmation from service bureau S that payment was 10 sent, a different confirmation from Bank C indicating that the transaction was completed, and possibly a third confirmation from biller B confirming that biller B credited consumer C's account in G/L database 42. Consumer C is also less in control of account 22. Since service bureau S maintains only 15 the payment information and recurring payment information and Bank C does not have that information, consumer C cannot look to one entity to provide a complete statement of the status of the account which was the source of the funds, since service bureau S has some of the information and Bank C has the rest.

Several variations of the system shown in Fig. 2 are 20 used today. In one variation, S sends an individual check 44 (unsigned - signature on file) drawn on C's account 22 to biller B in response to bill pay order 56. This clears as in bill pay system 10 (Fig. 1, arrows 3-7), but B must process 25 these one at a time, since they are exception items. This reduces the possibility that B will refuse to process check 44, since it only differs from the expected payment form by lacking a coupon. Thus, biller B is less likely to refuse 30 this form of payment over a check and list, and the biller is less likely to have problems of the list not balancing or having bad account numbers.

In a second variation, instead of a check from Bank C cleared through Bank S to credit S's account 70, S has Bank 35 S submit a debit to C's account 22 through the Automated Clearing House ("ACH") (see Fig. 3 and accompanying text). In a third variation, in place of arrows 12-17, ("check and list"), S may send A/R data and a credit to biller B through one path of: i) Bank S to ACH to Bank B to biller B or ii)

MasterCard's RPS (Remittance Processing System) to Bank B to biller B. As used here, the RPS is merely an alternative to the ACH. In a fourth variation, a combination of the second and third variations, S sends simultaneous ACH transactions (debit account 22 and credit account 26).

Fig. 3 is a block diagram of yet another bill pay system 80, which is usually used with billers who expect regular, periodic and small payments. Relative to the previously discussed bill payment systems, billers generally prefer bill pay system 80 when they are set up to handle such transactions.

Bill pay system 80, while providing more efficient remittance processing by biller B due to its increased control over the process, leaves consumer C with very little control over the bill pay transactions after the relationship is set up, since consumer C is typically required to give biller B an open ended authorization to withdraw funds. Furthermore, bill pay system 80 is not appropriate for all types of billers, such as those who do not have an on-going and predictable relationship with consumers.

Fig. 3 introduces several new items which flow among the participants including ACH 81, such as a voided check 84, a debit advice 86, a pre-authorization message 88, and a debit request message 90. In bill pay system 80, biller B is required to maintain an additional customer database 82.

For bill pay system 80 to work properly, there is an enrollment phase (arrows 1-4) and an operational phase (arrows 5-13). In the enrollment phase, consumer C gives biller B voided check 84, which biller B uses to initiate pre-authorization message 88. Biller B is not allowed by ACH 81 to directly submit pre-authorization message 88, which means Bank B, an ACH Originating Financial Depository Institution (OFDI), must get involved and submit message 88 to Bank C, an ACH Receiving Financial Depository Institution (RFDI). After pre-authorization message 88 is accepted by Bank C, Bank C will accept Bank B initiated automatic debits to be posted to C's account 22. In the operational phase, biller B queries customer database 82 to determine if consumer

C is enrolled as an automatic debtor. If so, biller B optionally sends debit advice 86 to consumer C, and sends debit request message 90 to biller B's bank, Bank B, which then sends it through the ACH 81 to Bank C, which debits C's account 22 and transfers the funds to biller B's account 26 via the ACH. The transaction is confirmed to consumer C on bank statement 38 sent to consumer C from Bank C. In this system 80, debit request message 90 might be rejected by Bank C for, among other reasons, non-sufficient funds, resulting in the flows along arrows 10-12.

Bill pay system 80 suffers from a lack of consumer control. Even if biller B fails to send debit advice 86 to consumer C, or initiates a debit request 90 for a different amount than contained in debit advice 86, it is up to C to unwind the transaction and bear the consequences of biller B's error(s). C's account 22 will get debited, and C has little or no control over the transaction date. Furthermore, if C has a dispute with biller B, it may be very difficult, short of closing account 22, to prevent biller B from taking a disputed amount from C's account 22.

While some billers may prefer bill pay system 80 over bill pay system 50 (Fig. 2), it nonetheless entails costs that exceed highly automated bill pay system 10 (Fig. 1), because biller B must enroll each of its customers using the system and maintain a separate customer database 82 for authorizations, debit amounts and debit period. This system also requires an extended enrollment period.

Enrollment is not really necessary in bill pay system 10 (Fig. 1), but is very much an issue in bill pay system 50 (Fig. 2) and bill pay system 80 (Fig. 3). In bill pay system 50, each consumer must undergo an enrollment process with their bill pay service provider. For a consumer to enroll, they must supply the bill pay service provider with a cancelled check, which is used to set up the authorization to withdraw funds from account 22. Because the consumer is enrolled using a specific account, the consumer cannot easily change that account, much less direct that payments be covered by funds in various accounts for various payments. Instead,

the consumer needs to keep the enrolled account open and must separately move the funds to cover bills to that account.

With bill pay system 50, the bill pay service provider must also enroll each biller to which a consumer requests payment if that biller has not already been enrolled by that service provider. To enroll a biller, a service provider must identify the means of payment for the biller, where the biller is located for mailing checks, etc.

With bill pay system 80, a consumer must enroll each biller separately, usually by sending a voided check to each, and the biller must enroll each consumer individually as well. In either system 50 or system 80, a consumer must wait several days or weeks until the consumer and the consumer's billers are fully enrolled.

The above shortcomings demonstrate that an improved means of paying bills is needed.

#### SUMMARY OF THE INVENTION

An improved bill paying system is provided by virtue of the present invention.

In one embodiment of a bill pay system according to the present invention, participating consumers pay bills to participating billers using a bill payment network (hereinafter "the payment network") where billers are universally identified and for which all participants agree to a set of protocols. The protocols include data exchange and messaging protocols as well as operating regulations which bind and direct the activities of the participants. The participating consumers receive bills from participating billers (paper/mail bills, e-mail notices, implied bills for automatic debts, etc.) which indicate an amount, and a unique biller reference number ("BRN") identifying the biller to the payment network. To authorize a remittance, the consumer transmits to its bank (a participating bank) a transaction indicating (1) an amount to pay, (2) the source of the funds, (3) a date on which to make the payment, (4) consumer C's account number with biller B (C-B account #), and (5) biller B's BRN. One or more of these elements might be represented

by a pointer to relatively static information stored at Bank C. For example, if consumer C always uses one of a few accounts as the source of funds, consumer C could submit a pointer indicating which account. Pointers are also a useful 5 way of specifying BRNs and C-B account #'s for frequently paid billers. A expansion of pointers to the pointed-to data can be done by Bank C maintaining look up tables for consumer C.

When Bank C receives the bill payment order from consumer C and expands any pointers as necessary, Bank C then 10 submits an electronic transaction, a payment message, into a payment network directed to Bank B (biller's bank), which is determined from the BRN of the transaction. The payment network could be an existing network, such as the VisaNet® network, in which case a bank would connect their computer 15 systems to computer systems at other banks through a VisaNet® Access Point (VAP) device. Using an existing network would allow the start-up costs of such a bill pay system to leverage other traffic in the network, such as the bank card transactions occurring over the VisaNet® network.

The BRN is assigned by the operator of the payment 20 network. For settlement, bank C debits the account designated by consumer C as the source of funds for that payment and is obligated to a net position with the payment network; likewise, bank B receives a net position from the payment 25 network and credits biller B's bank account. Bank B's net position is equal and opposite to Bank C's net position except for a small processing fee, which is collected by the payment network from the transfer to finance the costs of operating the payment network. The net position could be equal to the 30 payment message amount, or could be offset slightly to cover interchange fees, which are fees passed between consumer banks and biller banks in one direction or the other to balance the costs of interacting with the payment network with the revenues from payment network services provided, thereby 35 easily balancing costs as appropriate, or processing fees which are fees used to fund the operating costs of the payment network.

The payment network can also handle foreign exchange. For example, Bank C can send out a payment message in a currency expected by Bank B, and receive a net position in the currency specified by Bank C, which may differ from the currency of Bank B, especially where Bank C and Bank B are in different countries. In other variations, Bank C sends the payment message to pay a bill in one currency, receives a net position in another currency, and takes funds from the consumer in a third currency.

Bank C does not submit the transaction until funds are good or Bank C is willing to take the risk of loss if funds are not good. Bank B, upon receipt of the transaction, releases the funds to biller B, and is assured that the payment network will credit Bank B with the funds from Bank C. The payment network might do this by issuing an order to move money from Bank C's settlement account to Bank B's settlement account at a settlement bank, which could be a commercial bank, the Federal Reserve bank in the case of Fed-Wire transactions, etc.

In an alternate embodiment, payment reversal messages are allowed to follow a payment message if sent within some period after the payment message, in which case Bank C might send payment messages without first securing funds. In specific embodiments, the consumer initiates the transactions manually, via paper, at an ATM, or via a PC, telephone keypad, screen telephone, or personal digital assistant ("PDA").

A further understanding of the nature and advantages of the inventions herein may be realized by reference to the remaining portions of the specification and the attached drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram of a bill pay system relying on postal mailed payments;

Fig. 2 is a block diagram of a bill pay system wherein consumers pay bills using a bill pay service bureau which has the consumers as customers;

5 Fig. 3 is a block diagram of a bill pay system where billers initiate automatic debits from consumers' bank accounts;

10 Fig. 4 is a block diagram of an embodiment of an electronic bill pay system according to the present invention, in which both sides of a bill pay transaction (consumer side and biller side) are coordinated through a payment network;

Fig. 5 is a diagram of the universal biller reference file shown in Fig. 4;

Fig. 6 is a more detailed description of the payment network shown in Fig. 4;

15 Fig. 7 is a block diagram of a variation of the electronic bill pay system shown in Fig. 4, wherein unsecured payments are processed and subsequently reversed through the payment network due to a non-sufficient funds (NSF) condition of the consumer's account;

20 Fig. 8 is an abbreviated block diagram of the electronic bill pay system shown in Fig. 4 showing the optional delivery of accounts receivable data directly to a biller by the payment network;

25 Fig. 9 is a flowchart of a process for a biller bank to sponsor a biller in an electronic bill pay system according to the present invention;

30 Fig. 10 is a flowchart of a process for a consumer to subscribe to a bill pay service provided by a consumer bank in an electronic bill pay system according to the present invention;

Fig. 11 is a flowchart of a process for a bill pay transaction by a participating consumer to a participating biller according to the present invention; and

35 Fig. 12 is an alternate configuration of an electronic bill pay system according to the present invention wherein transactions are initiated through an existing funds network via a service bureau rather than by a consumer dealing directly with their bank.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 4 is a block diagram of a bill pay system 100 in which consumers pay billers through a payment network which forms a backbone for funds clearing and settlement. System 100 is enabled in part by unique identifiers assigned by the payment network operator to each participating biller, and by the adherence of the participants to pre-agreed protocols. Consumers and billers participate in the bill pay system, but they need not deal with the many consumers or many billers directly. Instead, they need only deal with their bank, or other participating financial institution. Bill pay system 100 includes as participants consumer C (12), biller B (14), consumer's Bank C (16), biller's bank B (18), and a payment network 102. It should be understood that Bank C and Bank B include some means of data and message processing, and that a reference to a bank is not only to the organization but also to the computer systems maintained by those organizations or agents of those organizations which operate the bank component of the payment network. As an example of the use of the computer system for data and message processing, the data processing means of Bank C is used to keep a balance on C's account 22, clearing account 24, and other accounts maintained by Bank C, as well as to place holds on funds and in general to process information and instructions received from consumer C and other consumers. The message processing means of Bank C are used to connect the data processing means of Bank C to consumer C and to payment network 102 to allow the passage of materials therebetween. The message processing means of Bank C also might include a manual or automatic means of capturing data from postal mail sent to Bank C and means for generating outgoing postal mail. Where a description of a bill pay system refers to an action taken by a bank (Bank C or Bank B), it is implied that this action is performed by either the bank's data processing means, the bank's message processing means, or processing means of a third party contracting processing services to the bank, possibly also involving steps requiring human intervention (especially during consumer subscription to the service and where consumer C's bill pay

interface is a person-to-person interface). It should also be understood that bank C and bank B need not fit the strict legal definition of a bank, but can be any manner of financial institution which the payment network operator allows to occupy the role of Bank C and/or Bank B.

The materials passed between the participants include customer invoice 120, bill pay order 122, payment message 124, A/R data file 40 and transfer order 130. Payment network 102 includes a settlement subsystem 104, a clearing subsystem 106, and a universal biller reference file 108.

In system 100, each consumer has a bank at which they maintain one or more accounts (or other means of guaranteeing funds to Bank C) from which they wish to pay bills and each biller has a bank at which they maintain an account into which they wish to receive payments. The consumer bank and the biller bank need not be different banks, but are shown separately nonetheless.. Presumably, consumer C has chosen a bank, Bank C, which provides C with C's preferred method of bill pay order 122 entry at an agreeable price, and biller B has chosen a bank, Bank B, which provides biller B with biller B's desired format of receiving A/R data file 40 at an agreeable price. Presumably, biller B's desired format is one which biller B selects to avoid the cost and occurrence of exception item processing. Each biller is assigned a unique identifier, the biller reference number, or BRN, which comprises n digits with the n-th digit being a modulus 10 check digit. In the examples described herein, n=9 and "918-272-642" is used as biller B's BRN. Non-numeric BRNs are also possible.

Biller B's BRN appears on bill 120 sent from B to C; bill 120 also includes an indication that biller B will and can accept electronic payments through this system (usually a payment network service mark), an indication of B's BRN, an amount due, possibly a due date, and C's C-B account number. Since a physical coupon is no longer needed by biller B, bill 120 could just as easily be an e-mail invoice as a postal mail paper invoice.

Bill pay order 122, shown passing from consumer C to Bank C, is either passed by hand, postal mail, telephone or electronically; electronically, however, is more likely. Order 122 contains B's BRN, C's C-B account number, an amount, 5 a desired transaction date, the source of funds, and authorization to pay the stated amount to the biller with that BRN. With more complex orders, multiple transaction dates and/or amounts might be provided. Consumer C and Bank C are free to agree on any order delivery system which provides this 10 data, be it computer-based, telephone-based, etc., and the means for verifying the authorization to debit funds, within the parameters of the payment network rules. One such example is a system where Bank C maintains tables of static data, and the elements of order 122 contain pointers to that static data 15 instead of the actual data, thus providing consumer C a shorthand means of entering the elements of order 122.

Payment message 124 passes from Bank C to Bank B via payment network 102. Significantly, message 124 does not contain B's account number 26, the final destination of the 20 funds. In the preferred embodiment, the payment network also does not know the number of account 26. Another advantage to biller B is that it can change account numbers with Bank B without having to indicate the change to other parties. Another advantage to biller B is that, since only Bank B knows 25 biller B's account number, only Bank B can initiate debits against that account. One advantage to consumer C is that they can change banks completely and continue making electronic bill pay remittances, having only to subscribe to an electronic bill paying service with another participating 30 payment network bank and without needing to make additional arrangements with other parties. This compares very favorably with the effort needed to change an automatic withdrawal payment, or a relationship with a service bureau, each of which requires the consumer to stop the previous relationship 35 and send a new voided check out.

The content of payment message 124 is checked by Bank C for validity and invalid payment messages are stopped either by Bank C or payment network 102 if the message does

not meet predefined edits. An edit is a mask or set of rules defining what does or doesn't look like a valid transaction. In some systems, the transactions go through even though they do not match the edits, but with a flag to indicate that they failed an edit test. It should be understood that payment network 102 need not be a localized system as shown in Fig. 4, but could be implemented by a distributed system such as an ATM network or the Visanet® network, with participating banks duplicating, or having access to, biller file 108.

Message 124 includes a BID (bank identification) identifying Bank C, a BID identifying Bank B, a BRN identifying biller B, a C-B account number identifying consumer C with biller B, an amount, and the implicit guarantee of Bank C to provide good funds to cover payment in the amount indicated by the message. Bank B's BID is found by using universal biller reference file (UBF) 108, or copies, as a look-up table.

Depending on the implementation, message 124 might also include a date/time stamp and unique message identifier which distinguishes a message from all other messages. Payment messages might also include additional information which is to be passed between consumer C, biller B, Bank C, and Bank B, in an agreed-upon format, to effect financial transactions (service charges, consumer C's internal descriptions which they desire to appear on future invoices from biller B and/or on bank statement 38), or non-financial messaging between participants.

A/R data file 40, passed from Bank B to biller B in an agreed-upon format with an agreed-upon timing, indicates which payment messages 124 having a specified data format were received by Bank B for biller's BRN, and includes the individual payment amounts and C-B account numbers of each payment message 124 received. Because biller B and Bank B are free to decide among themselves how A/R data file 40 will be presented to biller B, biller B can take advantage of the economies of scale once enjoyed by billers when all payments were received by postal mail, since the biller receives A/R data file 40 in the same way for all of B's customers who are

participants, regardless of which participating bank the consumers use or what mechanism the consumers used to initiate the bill pay process. Even if some payments arrive in the usual, non-exception item, manner, biller B can arrange for  
5 Bank B to provide file 40 in a form which is similar enough to the usual payment method, so the payment network payments are not exception items, as they are in the prior art where biller B is not a participant and thus cannot control how payment information is received.

10 Payment network 102 maintains biller file 108, which has one record per BRN and is used by Bank C to look up information to be displayed for a consumer under certain circumstances and to update locally maintained copies 158 of the file. Fig. 5 shows the structure of universal biller  
15 reference file 108. In file 108, a record for a biller is retrieved by the biller's BRN, the file's key. Each record includes a key (a BRN), a biller bank ID (BID), a C-B format mask (CBMASK), name and address of the biller as appears on the payment coupon included with their bill (to provide  
20 consumers with feedback as to whether the correct BRN was entered during a payment or enrollment process), and other useful biller information. The specific record for biller B is located using the BRN 918-272-642. Biller B's record in file 108 indicates bank B's BID and a CBMASK for biller B.  
25 The BID, which is "493217" in this example, identifies the destination bank of the payment message, which in this case is Bank B. The BID relieves consumer C from having to know to which bank to send payments, or which account at that bank to credit. With the combination of the BRN and the BID, the  
30 destination bank can be identified, and with the BRN, the destination bank can use a privately held file, biller account number (B-acct) table 140 (see Fig. 6), so that consumers and consumer banks are not aware of biller B's account number. One advantage to this arrangement is that, outside of Bank B,  
35 biller B's account number is not known, so it would be less likely that someone other than Bank B and biller B could present a withdrawal transaction to that account. One type of withdrawal from biller B's account which is possible knowing

only biller B's BRN is a payment reversal message, which is only allowed in those payment networks which allow unsecured payments to be reversed, and a withdrawal can only affect a previously submitted payment message. However, given that the  
5 payment reversal message is tied to a payment message, a properly set up payment network cannot be used to effect a net withdrawal (of course, biller B's account might get assessed service fees for the reversal).

The field CBMASK is used to validate C-B account  
10 number format, and identifies the format of biller B's C-B account numbers. For example, if biller B was a Visa® card issuer, the biller's CBMASK might be "4932^####^####^####C", which indicates that a valid consumer's account number with the Visa® card issuer must begin with "4932", followed by  
15 three groups of four digits (0-9), the carets ("^") indicating optional spaces, and "C" indicating that the last digit is a check digit. Additionally, the CBMASK field might include a procedure for calculating allowed account numbers, ranges of account numbers or check digits. A Visa® card issuer is used  
20 as an example, and file 108 might also include a record for a utility company whose CBMASK is "###-A-##x", where "A" indicates that a letter must be present in that location and "x" indicates that the last character is not important to identifying the consumer and can be anything.

Fig. 5 shows BRNs in a form using spacers which is easily read and remembered by a person, although data processors typically store and manipulate the BRNs without need for the spacers. The last digit of the BRN is a modulus 10-check digit, which is used to detect errors in BRNs supplied by consumers. Using the above notation, a BRN is checked against the form ###-###-##C, where C is calculated as  
30 a modulus 10-check digit.

In a variation of UBF 108, the first digit of the BRN indicates a particular geographic region or the biller's industry, and UBF 108 is subdivided into individual files for each region or industry. This could be used as a means for market separation, efficient file storage, or specialized reporting requirements.

Fig. 6 is a more detailed block diagram of payment network 102 and its environs, which shows how payment message 124 passes from Bank C through clearing subsystem 106 to Bank B. Clearing subsystem 106 is used to log and transfer payment messages 124 from consumer banks to biller banks. Consumer banks and biller banks need not be separate; a bank can be both a biller bank and a consumer bank if it provides the necessary elements of both. Settlement subsystem 104 is coupled to clearing subsystem 106, and is used to transfer funds (or simply net funds) between Bank C and Bank B, and all other consumer and biller banks participating in the payment network, according to the payment messages received and processed by clearing subsystem 106. Settlement subsystem 104 does this by submitting transfer orders 130 to a settlement bank 128.

The major blocks shown in Fig. 6 are Bank C 16, Bank B 18, payment network 102, and settlement bank 128. Bank C is shown with a packet assembler 160 coupled to a UBF (universal biller reference file) copy 158 and to clearing subsystem 106. Bank B is shown with a packet disassembler 162 coupled to clearing subsystem 106, biller account number (B-acct) table 140, and a UBF copy 158 used when Bank B is a consumer bank or when Bank B seeks to independently check C-B account numbers. Payment message 124 is shown with four components: a BRN, a C-B account #, an amount, and a destination BID. Settlement Bank 128 is shown with four accounts: a settlement account 154 for Bank C, a settlement account 155 for Bank B, a settlement account 152 for the payment network, and a settlement account 156 representing settlement accounts for other banks besides Bank C and Bank B. Settlement bank 128 is shown coupled to settlement subsystem 104 to accept transfer orders 130, which would then result in transfers of funds between accounts 152, 154, 155 and other accounts for other banks 156. The accounts 152, 154, 155, 156 might comprise multiple accounts, such as where each bank maintains a settlement account for a variety of currencies.

Clearing subsystem 106 is shown with a transaction logger 164 coupled to a line carrying payment message 124 and

to a currency foreign exchange module 166. Settlement subsystem 104 is shown with a net position settlement processor 168 and a settlement report generator 170 coupled to reporting lines 172. Reporting lines 172 are coupled to the 5 banks 16,18 to provide data about net settlement amounts, summary data about payment messages, and currency exchange data, if necessary. In a nonguaranteed payment network system, clearing subsystem also allows NSF messages to follow payment messages to cancel out a payment message sent earlier. 10 In a mixed system, a flag in UBF 108 might indicate which billers are willing to receive nonguaranteed payments and which are willing to receive only guarantee payments, so that Bank C may assess their risk accordingly.

Bank C uses packet assembler 160 to check the data 15 in payment message 124 before it is sent out. Bank C secures funds in the amount of message 124 if it has not already done so, and rejects the transaction before sending message 124 if the funds are not secured and the biller expects a guaranteed payment. Packet assembler 160 also checks the supplied BRN 20 and C-B account number against UBF copy 158. If the BRN is not found in file 158, the transaction is rejected. If the BRN is found, but the C-B account number does not meet the criteria set by CBMASK, the transaction is rejected, thus saving biller B or Bank B the expense of 25 rejecting the transaction, and providing quicker response to Bank C and consumer C as to the transaction's invalidity. Alternatively, biller B might request that messages which fail the CBMASK test be sent to them with an indication that they failed the CBMASK test. UBF Copies 158 are kept up to date by 30 payment network broadcasts of updates to UBF 108 which come from Bank B and other biller banks.

If the transaction is allowed by Bank C, message 124 is sent into payment network 102, and is received by Bank B. Often, this passage of the message is the entire transaction. 35 Although the transaction is actually between Bank C and Bank B, it is actually a transfer from consumer C to biller B because of the pre-agreed protocols for funds transfer.

Table 140 stores BRNs and biller account numbers such that a BRN can be used to look up a biller's account number. Table 140 might also contain information indicating the desired data transfer protocol for transferring file 40 to biller B. Table 140 does not need to exist outside of Bank B.

Using bill pay system 100, consumers can pay bills presented by billers easily, quickly and accurately, without having to make separate arrangements with each biller in advance. Billers can accept and process bill pay remittances quickly and less expensively than before. Billers also need not deal with each individual consumer in their customer base, but can make arrangements with the biller bank to be attached to bill pay system 100. Billers also have a preferred electronic process they can advertise to consumers wishing to remit bill payments using bill pay system 100. Using bill pay system 100, consumer banks and biller banks are free to provide different interfaces between the banks data processing systems and their customers (consumers and/or billers) to facilitate bill paying depending on the needs and wants of their customers. Even while many consumers use different interfaces to insert bill pay transactions into the consumer banks' bill pay processing systems, and while many billers receive necessary A/R data from their banks in different formats for each biller, the bill pay transactions can flow from consumer banks to biller banks using a novel payment network according to the present invention. With the apparatus described above, and usually in conjunction with a symbol or trademark identifying banks and billers as participants who agree to a set of regulations prescribing payment network activities, good funds can flow from consumers to billers in much less time than was previously possible and with much greater assurance of payment.

Fig. 7 is a block diagram of a variation of the electronic bill pay system shown in Fig. 4, where the consumer's bank is allowed to follow up a payment message with a payment reversal message (shown as an NSF notice 46). Additional links are shown as part of payment system 100A. In this system, consumer C issues bill pay order 122 as before,

but Bank C issues an unsecured payment message 125 to payment network 102 (arrow 3), which is passed to Bank B (arrow 4). Sometime after sending an unsecured payment record 127 to B (arrow 7) (which informs biller B, in a non-exception item way, of the occurrence of message 125), Bank C determines that consumer C's account does not contain sufficient funds to cover the amount of the previously submitted unsecured payment message 125. Bank C therefore submits an NSF notice 46 to payment network 102 (arrow 8) which passes to Bank B and biller B (arrows 9-12) resulting in the reversal of the previously submitted unsecured payment 125 from B's account 26 at Bank B and the effects of record 127 from B's general ledger 42. While arrows 3 and 8 and arrows 4 and 10 are shown as separate links, often the same path will be used for payment messages and payment reversal messages such as NSF notice 46.

Fig. 8 is an alternate configuration 100B of a bill pay system wherein the payment network operator provides payment data directly to the biller. Fig. 8 shows bill pay system 100B with consumer C, Bank C, payment network 102, bank B, and biller B. Biller B sends invoice 120 to consumer C, who sends bill pay order 122 to Bank C, which issues payment message 124 into payment network 102. Payment message 124 is passed on to Bank B, but the A/R data (date, amount, C-B account #) from message 124 is passed directly to biller B, on behalf of Bank B, and is used to update biller B's G/L database 42. In some cases, this method might be preferred by biller B who can obtain the data sooner, and by Bank B which is no longer obligated to maintain and transfer A/R data to biller B. This is a good alternative for high-volume billers. Optionally, Bank B will provide A/R summary data 129 to biller B.

Figs. 9-11 describe processes according to the present invention for facilitating consumer bill payment to billers using the previously described apparatus or other apparatus not illustrated here. The processes described in the flowcharts of Figs. 9-11, in some embodiments, involve manual data entry, automatic data capture, person-to-person

interaction among the participants, and/or appropriately programmed computers and computer networks. However, in a preferred embodiment, most of the steps of the process are performed by software routines in computers, computer

5 networks, and telecommunications equipment.

Fig. 9 is a flowchart describing the process of converting a non-participating biller into a participating biller. A participating biller is an entity which bills its customers and collects funds for those bills at least

10 partially through an electronic bill pay system according to the present invention.

The process of a biller becoming a participating biller begins at block 200 when the biller opens a bank account with a participating biller bank. Of course, the biller might already have such an account, in which case this step can be skipped. A participating biller bank is a bank which has agreed to accept payment messages from consumer banks through the payment network in a form specified by the operator of the payment network. A participating biller bank also agrees to maintain a settlement account which the payment network can debit/credit for the net of all transactions (originals, returns, etc.) involving all of the billers sponsored by the biller bank. A participating biller bank also agrees to transfer funds in the amount of received payment messages to billers' accounts, to maintain in their data processing systems a cross-reference table which can be used to identify a biller's account number from just a unique BRN (biller reference number) assigned to the biller, and to abide by the terms and conditions of the payment network rules for services they offer billers.

As part of the agreements with the payment network operator, the banks agree to the terms of processing fees and interchange fees. In this way, the interchange fee can serve as a cost-balancing device. These fees might be paid by the consumer banks and/or the biller banks, and in some cases, some fees will be paid to the consumer banks or the biller banks, in the form of interchange fees. With interchange fees, transactions which otherwise would be uneconomical to

one party can occur. The interchange fee is easily collected in the transfer orders submitted to a settlement bank; the transfer orders can move money in any direction between the accounts of the consumer banks, biller banks, and the payment network's settlement account.

At block 202, the biller and the biller bank agree on a data transfer protocol for transferring A/R data included in payment messages sent to biller bank so that the A/R data can be efficiently (and usually electronically) transferred to the biller. This step may include a connection of leased or dial-up lines between the data processing systems of the biller bank and data processing systems of the biller. Alternatively, the biller bank may sponsor a biller direct connection to the payment network. The agreed-upon protocol between the biller and the biller bank might include terms such as the arrangement of the data to be transferred to the biller, the frequency with which the data is to be transferred, and/or the service charges biller bank collects from biller for the provision of data. While provision of A/R data will be generally expected by billers, it is also possible for the biller and biller bank to agree that biller bank will just deposit the funds and not provide A/R data. Such might be useful for payments to charitable collection funds. At this point, the biller will also indicate to biller bank what constitutes an acceptable C-B account number to biller, so that the biller bank can send it to the payment network for insertion into UBF 108 and subsequent broadcast.

Once the biller and biller bank have agreed to a protocol, then at block 204, the biller bank requests a new biller record from the payment network. In response, at block 206, the payment network issues a new biller reference number which is unique to the biller. In an alternate process, the payment network assigns a pool of numbers in advance to the biller bank, from which the biller's BRN is drawn. The biller bank, in that case, instead of requesting a number, informs the payment network of the activation of a BRN from its pool and the format of acceptable C-B account numbers for that BRN plus other biller-unique data normally printed on a payment

coupon for verification that the BRN is the BRN of the desired biller. In a preferred embodiment, this process occurs substantially electronically.

At block 208, the payment network publishes/broadcasts the new participating BRN and related data to all participating consumer banks to enable consumer validation of biller and routing of vendor A/R data.

Finally, at block 210, the biller identifies its BRN to its customers, especially on its bills and mailings announcing the new service, and biller is then set up to accept payment network payments. Billers may also at this time actively solicit payment network-based payments from their customers.

In a preferred embodiment, the process is highly automated and simple for a biller. It is expected that the payment network system will have as many participating banks as now participate in the Visa® system. Since this is nearly all major banks, there will be a high probability that any given biller's bank will be a participating bank. Therefore, the biller need only sign up for the payment network service with its existing bank, receive a BRN and publicize its BRN number.

As Fig. 10 shows, the process for consumers to subscribe to a consumer bank's service for paying bills via the payment network system is just as simple. At block 230, a consumer subscribes to an electronic bill payment service with a participating consumer bank. Again, the consumer is quite likely to already bank at a participating consumer bank. If not, participating consumer banks can be easily identified through the use of a widely recognized logo or service mark, much the same way the Visa® service mark identifies bank Visa® card issuers and merchants accepting Visa® cards for payment.

At block 232, the consumer and the consumer's bank agree to details of a service for consumer C to direct bank C to initiate, and pay for, bill pay orders. A bank's service need not offer all the possible interfaces or payment from more than the consumer's main deposit account. Banks might compete for customers by offering different interfaces and

service charges. For example, a consumer bank might offer software to its customers, who would run the software on their personal computers, and the software would transmit bill payment orders over a modem to a modem connected to the consumer bank's data processing system. These bill payment orders might include orders to pay a bill at once, to pay a bill in the future, or to pay a recurring bill periodically.

5 Another possible interface is a voice response system wherein a consumer dials in to a telecommunication system maintained for the consumer bank, listens to questions asked ("Which biller would you like to pay now?", "How much do you want to pay?", etc.), and the consumer responds by pressing keys on the consumer's telephone. The consumer might also use a telephone with a visual display, or an interface using the consumer's television as an interface, such as might be provided as a service of consumer's cable television provider connecting the consumer to the consumer's bank or an ATM.

10 Although it is probably less efficient, the interface to the bank might also be via postal mail, where the consumer mails bill pay orders to the consumer bank. This alternative might be the only solution in areas where telecommunication is not readily available or where the consumer is adverse to using voice response systems or computers.

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Next, at block 234, the consumer identifies which of their bills can be paid via the payment network that they want to pay using the payment network. As suggested above, if billers identify their participation in the payment network system by displaying the designated logo, and consumers are aware of the meaning of the logo, the consumers will be able to easily identify participating billers.

30

Fig. 11 is a flowchart of a bill payment process according to the present invention between a participating consumer and a participating biller. At block 250, the biller sends the consumer a bill, via postal mail, e-mail, or other means. This bill indicates the amount due, the biller's BRN, and a due date. Any participating consumer can pay a bill through the payment network to any participating biller. If a consumer and a biller are participants in the payment network

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system, and the biller sends the consumer a bill containing an indication that the biller can and will accept payment network payments, the biller's BRN, an amount due, a due date, and the consumer's C-B account number, the consumer can easily handle  
5 the payment through the payment network. Because the biller reference number is universal (different banks and different consumers all use the same number), the number can be assigned to a biller before a consumer indicates the desire to pay the biller, thus making it possible for the biller to include its  
10 BRN on the very first bill sent to the consumer after subscribing to the bill pay service. In many cases, enrollment of a biller by a consumer is not necessary, and if it is, it involves nothing more than the consumer reviewing a copy of the biller information gathered by Bank C from the UBF record with the biller's BRN, to verify that the BRN refers to  
15 the desired biller, and setting up static data tables which would allow the consumer to select a source of funds, a BRN, and/or a C-B account # with a pointer. Pointers provide quicker data entry, in much the same way as "speed-dial"  
20 provides quicker dialing of telephone numbers. By contrast, in other bill pay systems, a biller's number may be different in different countries, in different bill pay service provider files, or different for each consumer.

At block 252, the consumer sends a bill payment order to the consumer's bank (Bank C). The order instructs Bank C to debit C's account with Bank C (or otherwise secure funds) on the date indicated in the order by the amount indicated in the order and forward the funds to the payment network with the BRN and C-B account number indicated in the  
30 order.

At block 254, Bank C checks for availability of funds for the transaction. If the funds are not available and Bank C does not have some other agreement with the consumer, the flow proceeds to block 256, where the consumer is informed of the rejection of the bill pay order. Significantly, an order stopped for non-sufficient funds does not get very far in a guaranteed funds payment network system before it gets reversed. Of course, Bank C might continue the transaction  
35

and later try to reverse it, but if the payment network rules are such that Bank C cannot reverse a payment message once it is sent out, then this is not likely to happen. Although the funds are normally taken from C's account, by agreement, Bank  
5 C might also obtain the funds from a savings account, line of credit, credit card account, or other financial instrument of the consumer.

Assuming the funds are available or Bank C agrees to be at risk for the funds, the flow proceeds to block 258. At  
10 block 258, Bank C confirms the biller using Bank C's copy of the UBF 158, or Bank C sends a query message to the payment network asking for the data. In some cases, biller confirmation is only done the first time an order with a given BRN is requested, and Bank C maintains a list of confirmed  
15 billers on behalf of the consumer.

Next, at block 260, Bank C checks the BRN and the C-B account number in the payment order for validity. If the BRN is not valid, or the C-B account number is not valid for the biller associated with the BRN, then flow passes to block  
20 262, where the order is rejected, otherwise the flow continues to block 264. Even though Bank C checks the order against the UBF copy, the payment network may again check the payment message formulated from the order and reject it if somehow Bank C incorrectly allowed the payment message to go through.

25 Next, at block 264, Bank C submits a payment message to the payment network, and by the payment network rules is liable for the amount of the payment. Because the funds pass from Bank C to Bank B through the payment network, there is very little chance that the consumer will lose money. Of course, Bank C may go out of business, but the fact that the money moved from one account under Bank C's control to another should not affect the ability of the consumer to get the funds back if a payment message was not sent. On the other hand, if the payment message was sent, by the payment network rules,  
30 the destination bank agrees to accept the payment message from Bank C and must credit the biller's account, who in turn must credit the consumer's account with the biller. Compared with using a service bureau, which may be holding consumer funds,

the payment network provides a much safer bill pay mechanism to consumers.

At block 266, the payment network debits Bank C in the amount of the payment message, and credits Bank B (the biller's bank) by the same amount. Then, at block 268, Bank B credits the biller's account, who in turn, at block 270, credits the consumer's account with the biller. Bank B might also supply further validation services to biller B. In that case, biller B would supply Bank B with a list of valid C-B account numbers, which Bank B would use to validate incoming payment messages and return those that contain invalid C-B account numbers, which is a more rigorous check of the account number than merely checking to see if the account number is in the right format.

Fig. 12 is a block diagram of an alternative bill pay system 300 wherein consumer C 302 initiates bill payment order 122 (arrow 1) via service provider S 312, interposed between C and Bank C 304, through an existing funds network 310, such as the Visanet® network, rather than by dealing directly with Bank C. Service provider 312 maintains a UBF copy 158 so that it can provide the necessary validations of payment message 124. Service provider 312, which is not C's bank, uses transactions over VisaNet® network 310 to secure good funds from Bank C 304. One way to accomplish this is by submitting a customer verification message 318, which includes some form of password identifying C and the amount of bill payment transaction 122, over the VisaNet® network 310 and waiting for authorization 316 (arrows 2-5) to proceed with sending payment message 124 (arrow 6).

Service bureau S, upon the receipt of authorization 316 from Bank C, submits payment message 124 over the VisaNet® network (arrows 6-7) resulting in settlement transfer order 130 being sent to settlement bank 128 (arrow 8). A/R data file 40 is delivered by Bank B 308 to biller B 306 (arrow 9).

The above description is illustrative and not

restrictive. Many variations of the invention will become apparent to those of skill in the art upon review of this disclosure. Merely by way of example, service bureaus might be interposed between consumers and consumer banks, and  
5 between billers and biller banks, as agents of banks which elect not to provide the bill pay service directly to consumers or billers. As another example, messages passed between participants are described above specifically at times, but a message could be interchangeably embodied in a  
10 postal mail paper form, an e-mail message, a telephone voice response session, etc. Furthermore, while some participants in the above electronic bill pay system are referred to as consumer banks and biller banks, they need not necessarily fit the legal definition for a bank, but instead may be a savings  
15 and loan, a thrift, a credit union, brokerage firm, etc., which maintains accounts for consumers and/or billers and which is coupled to the payment network.

The scope of the invention should, therefore, be determined not with reference to the above description, but  
20 instead should be determined with reference to the appended claims along with their full scope of equivalents.

WHAT IS CLAIMED IS:

1           1. A bill pay system wherein a consumer directs a  
2 consumer financial institution to pay a biller's bill,  
3 comprising:

4           a consumer bill pay interface to a consumer  
5 financial institution computer equipped to accept a bill pay  
6 order from the consumer, said bill pay order including at  
7 least an indication of a biller identification (ID), an amount  
8 to be paid, and an indication of a consumer-biller account to  
9 be credited, said consumer-biller account being an account  
10 maintained by the biller to determine amounts owed to the  
11 biller by the consumer;

12           payment message generation means coupled to said  
13 consumer financial institution computer for generating a  
14 payment message based on information contained in said bill  
15 pay order, said payment message comprising at least an  
16 indication of said biller ID, said amount to be paid, and said  
17 consumer-biller account;

18           a payment network, coupled to said payment  
19 generation means, for transmitting said payment message, said  
20 payment network comprising a universal biller reference data  
21 file for identifying a destination for said payment message  
22 from said biller ID included in said payment message, and for  
23 debiting an account of the consumer financial institution  
24 according to said amount in said payment message;

25           payment message accepting means, coupled to said  
26 payment network and to a biller financial institution computer  
27 at said destination, for accepting said payment message from  
28 said payment network and crediting an account of the biller  
29 according to said amount in said payment message; and

30           biller data processing means, coupled to one of said  
31 payment network or said payment message accepting means, for  
32 processing biller data included in said payment message and  
33 providing said data in a form used by said biller to update  
34 said consumer-biller account to reflect a credit of said  
35 payment message amount.

1               2. The apparatus of claim 1, wherein said universal  
2 biller reference data file includes criteria for  
3 consumer-biller account numbers, wherein said consumer-biller  
4 account number in said payment message is deemed valid if it  
5 satisfies said criteria.

1               3. The apparatus of claim 1, wherein pointers are  
2 used to point to at least one of a consumer-biller account  
3 number, a biller ID, or a source of funds stored in said  
4 consumer financial institution computer.

1               4. The apparatus of claim 1, wherein said bill pay  
2 order further comprises an indication of a source of funds  
3 among accounts which the consumer is authorized to debit.

1               5. The apparatus of claim 1, wherein said consumer  
2 financial institution and said biller financial institution  
3 are one in the same.

1               6. The apparatus of claim 1, wherein a given  
2 financial institution is a consumer financial institution for  
3 some consumers and a biller financial institution for some  
4 billers.

1               7. The apparatus of claim 1, further comprising  
2 means for assuring payment from the consumer to the consumer  
3 financial institution for accepting a debit in response to  
4 sending a payment message.

1               8. The apparatus of claim 7, wherein said means for  
2 assuring is provided by the consumer maintaining at least one  
3 of a checking account, savings account, or line of credit with  
4 a sufficient balance.

1               9. The apparatus of claim 1, wherein said means for  
2 assuring is a means for securing funds from the consumer prior  
3 to sending a payment message to said payment network.

1               10. The apparatus of claim 9, wherein said means  
2 for securing funds is an account transfer program which debits  
3 the consumer's account and credits a suspense account.

1               11. The apparatus of claim 1, further comprising  
2 verifying means coupled to said consumer financial institution  
3 computer, for verifying authorization to obligate the consumer  
4 for amount of said bill payment order.

1               12. The apparatus of claim 11, wherein said  
2 verifying means comprises means for the consumer to enter a  
3 personal identification number and means in said consumer  
4 financial institution computer for detecting if said entered  
5 personal identification number matches a predetermined  
6 personal identification number for the consumer.

1               13. The apparatus of claim 11, wherein said  
2 verifying means comprises means for the consumer to insert a  
3 machine-readable card into a card reader coupled to said  
4 consumer financial institution computer, wherein possession of  
5 a valid card is evidence of authorization.

1               14. The apparatus of claim 1, wherein functionality  
2 of said consumer financial institution computer is provided by  
3 a third-party transaction processor.

1               15. The apparatus of claim 1, wherein said payment  
2 message amount is denominated in a first currency, and said  
3 amount debited from the consumer financial institution  
4 denominated in a second currency.

1               16. The apparatus of claim 15, wherein the  
2 consumer's obligation to the consumer financial institution is  
3 denominated in a third currency.

1               17. The apparatus of claim 1, wherein said payment  
2 message amount is debited from an account designated by the  
3 consumer, said payment message amount is debited from the

4 consumer financial institution, and said payment message  
5 amount is credited to said biller financial institution.

1 18. The apparatus of claim 17, wherein a service  
2 fee is also debited from said account designated by the  
3 consumer as a service fee imposed by the consumer financial  
4 institution.

1 19. The apparatus of claim 17, wherein at least one  
2 of said amount debited from the consumer financial institution  
3 and said amount credited to said biller financial institution  
4 is adjusted by a payment network processing fee.

1 20. The apparatus of claim 1, wherein said amount  
2 debited from the consumer financial institution and the amount  
3 credited to said biller financial institution is offset from  
4 said payment message amount to effect an interchange, whereby  
5 costs are balanced between the consumer financial institution  
6 and said biller financial institution.

1 21. A method of paying bills, comprising the steps  
2 of:

3 determining an amount to be paid to a selected  
4 biller, said amount owed to said selected biller by a  
5 consumer;

6 identifying said selected biller by indicating a  
7 unique biller identification (ID);

8 providing at least said amount and said biller ID to  
9 a consumer financial institution;

10 transmitting an outbound payment message from said  
11 consumer financial institution to a payment network, data  
12 elements of said outbound payment message including at least  
13 said amount and said biller ID;

14 identifying, from said biller ID, a biller financial  
15 institution for which said outbound payment message is  
16 destined;

17 transmitting an inbound payment message from said  
18 payment network to said biller financial institution;

19 crediting said biller's account with said biller  
20 financial institution by said amount of said inbound payment  
21 message; and

22 providing data from said inbound payment message  
23 including at least said amount and said consumer-biller  
24 account number to said biller.

1 22. The method of claim 21, further comprising the  
2 step of securing at least a guarantee of funds from said  
3 consumer in favor of said consumer financial institution.

1 23. The method of claim 21, further comprising the  
2 step of sending a payment reversal message from said consumer  
3 financial institution to said payment network within a  
4 predetermined time after sending a payment message if said  
5 payment message is sent without said consumer financial  
6 institution first securing funds and funds are subsequently  
7 not available from said consumer.

1 24. The method of claim 21, wherein said step of  
2 providing data to said biller is performed with said biller  
3 financial institution computer as an intermediary destination  
4 for said data.

1 25. The method of claim 21, wherein said step of  
2 providing data to said biller is performed over a connection  
3 between said payment network and said biller.

1 26. The method of claim 21, wherein said step of  
2 generating said inbound payment message occurs only when data  
3 in said outbound is verified in a verification step.

1 27. The method of claim 21, further comprising a  
2 verification step which comprises the steps of:

3 checking a biller reference file to determine if  
4 said biller ID of said outbound payment message is an active  
5 biller ID; and

6                    sending an error message back to said consumer  
7 financial institution when said biller ID of said outbound  
8 payment message is not an active biller ID.

1                    28. The method of claim 27, wherein said  
2 verification step further comprises the steps of checking said  
3 consumer-biller account number of said outbound payment  
4 message against predetermined criteria for valid account  
5 numbers, said predetermined criteria being stored in said  
6 biller reference file for each biller, and if not, sending an  
7 error message back to said consumer financial institution to  
8 that effect.

1                    29. The method of claim 28, further comprising the  
2 step of flagging payment messages sent over said payment  
3 network to indicate said predetermined criteria was not met,  
4 when said predetermined criteria is not met.

1                    30. The method of claim 21, further comprising the  
2 step of adjusting at least one of said amount debited from  
3 account of said consumer, said amount debited from said  
4 consumer financial institution, and said amount credited to  
5 said biller financial institution to effect the transfer of at  
6 least one of a processing fee to an operator of said payment  
7 network or an interchange fee to balance costs between said  
8 consumer financial institution and said biller financial  
9 institution.

1                    31. The method of claim 21, wherein at least one of  
2 said data elements is a pointer to data stored by said  
3 consumer financial institution computer and said pointed to  
4 data is substituted for said pointer by said consumer  
5 financial institution.

1                    32. The method of claim 21, further comprising the  
2 step of translating said consumer-biller account number  
3 provided by said consumer according to a translation table

4 provided by said biller to effect new consumer-biller account  
5 numbers.

1           33. A method for paying a bill from a biller to a  
2 consumer, comprising the steps of:

3           verifying the authority of the consumer to issue a  
4 bill payment order;

5           accepting said bill payment order at a consumer  
6 financial institution from the consumer, said bill payment  
7 order comprising data elements indicating at least a source of  
8 funds, a biller ID, a customer-biller account number assigned  
9 by the biller and a payment amount, wherein said biller ID  
10 identifies the biller to each consumer;

11          if said bill payment order is guaranteed, securing  
12 at least a guarantee of funds from the consumer in favor of  
13 said consumer financial institution;

14          transmitting an outbound payment message from said  
15 consumer financial institution to a payment network, said  
16 outbound payment message including at least said amount, said  
17 consumer-biller account number and said biller ID;

18          identifying, from said biller ID and a biller  
19 reference file, a biller financial institution for which said  
20 outbound payment message is destined;

21          transmitting an inbound payment message from said  
22 payment network to said biller financial institution;

23          crediting said biller's account with said biller  
24 financial institution by an amount corresponding to said  
25 amount of said inbound payment message;

26          debiting said consumer financial institution by an  
27 amount corresponding to said amount of said inbound payment  
28 message; and

29          providing, from said biller financial institution's  
30 computer, data from said inbound payment message including at  
31 least said amount and said consumer-biller account number.

1           34. The method of claim 33, wherein at least one of  
2 said data elements is a pointer to data stored by said  
3 consumer financial institution computer and said pointed to

4       data is substituted for said pointer by said consumer  
5       financial institution.

1               35. A payment network for transferring funds from a  
2       consumer to a biller electronically to pay a bill owed by the  
3       consumer to the biller, comprising:

4               a payment network coupling transaction processors of  
5       participating financial institutions;

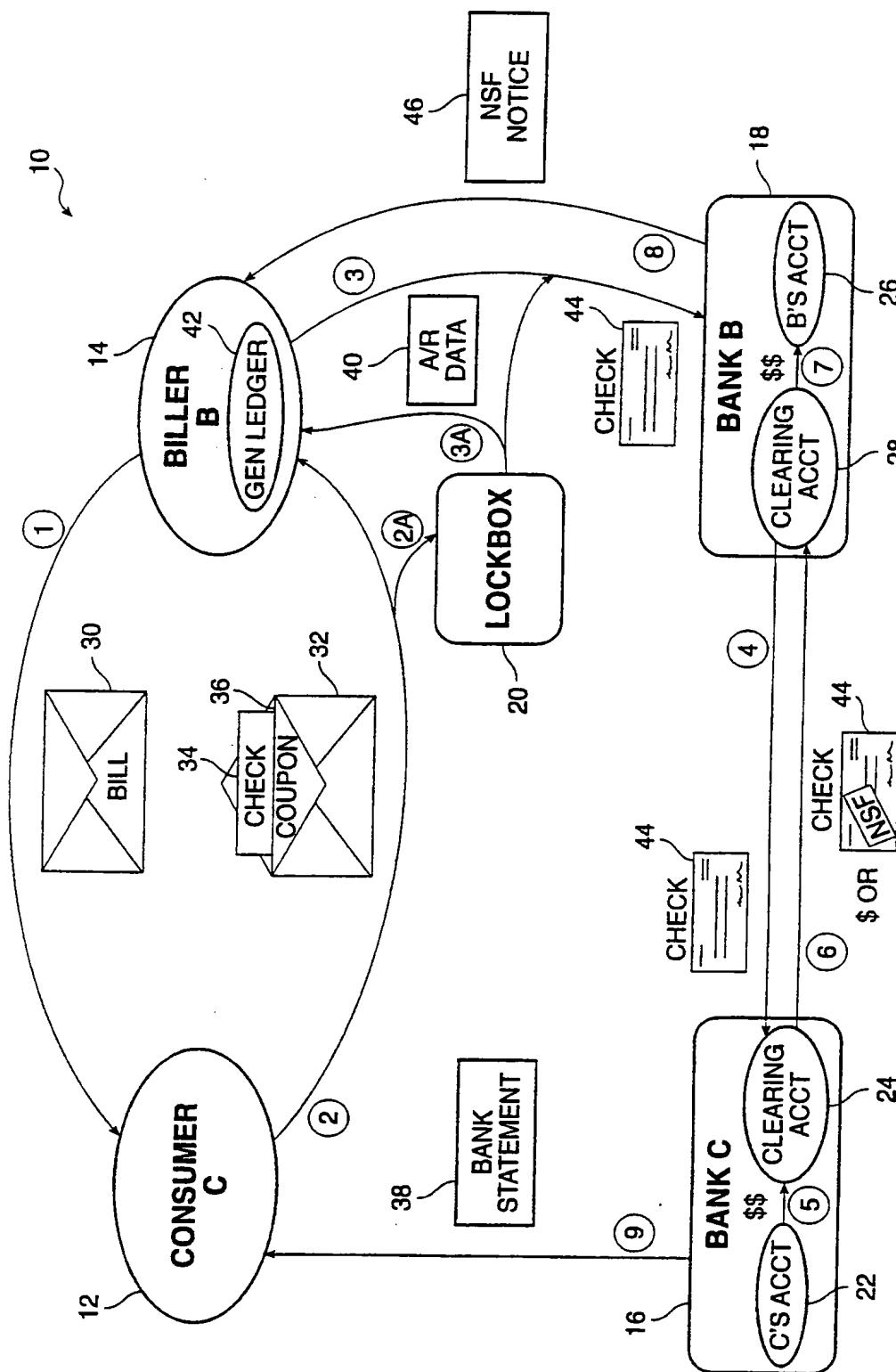
6               an initiating financial institution which initiates  
7       a payment message from its transaction processor to said  
8       payment network in response to a bill pay order issued by the  
9       consumer, said payment message identifying the biller by a  
10      biller ID assigned to the biller for use with each consumer  
11      which is a customer of the biller and which biller ID is  
12      disclosed to consumers desiring to make payments to the biller  
13      using said payment network;

14              a receiving financial institution which receives  
15       said payment message at its transaction processor from said  
16       payment network, wherein both said receiving financial  
17       institution and the biller are identifiable from said biller  
18      ID;

19              means for debiting said initiating financial  
20       institution and crediting said receiving financial institution  
21       by amounts corresponding to an amount included in said payment  
22       message; and

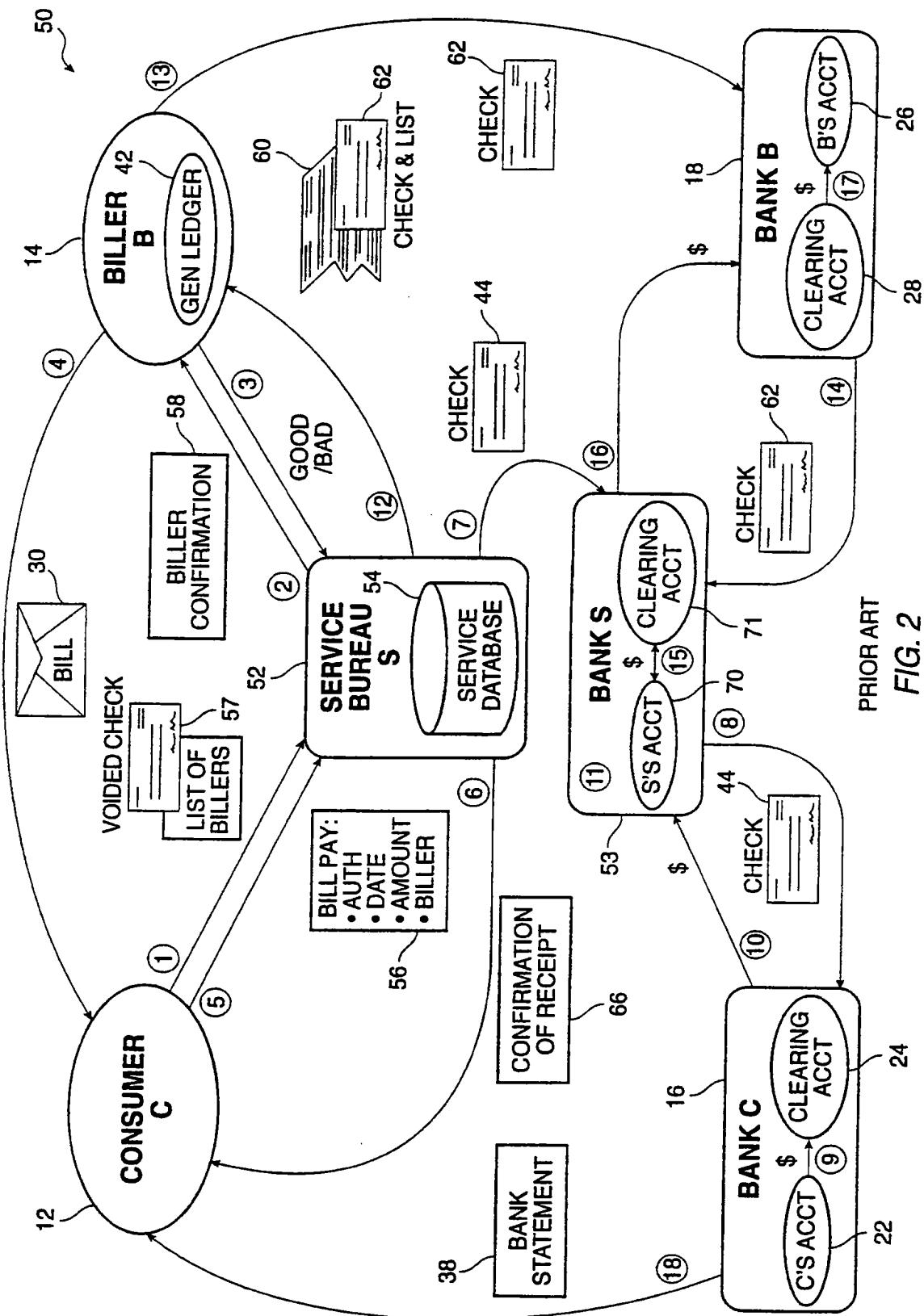
23              means for crediting the consumer's account with the  
24       biller by said amount included in said payment message.

1/12



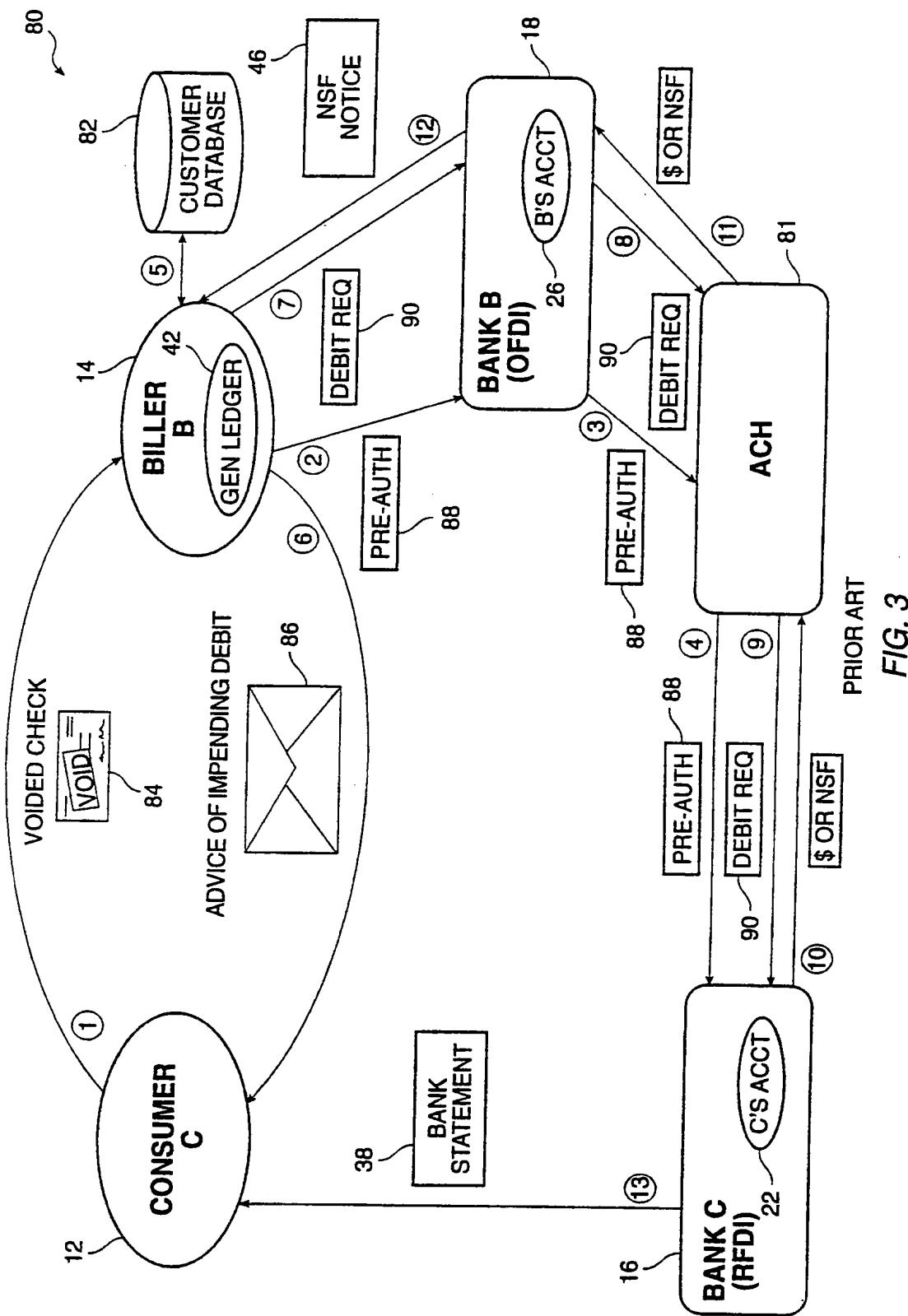
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**SUBSTITUTE SHEET (RULE 26)**

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SUBSTITUTE SHEET (RULE 26)

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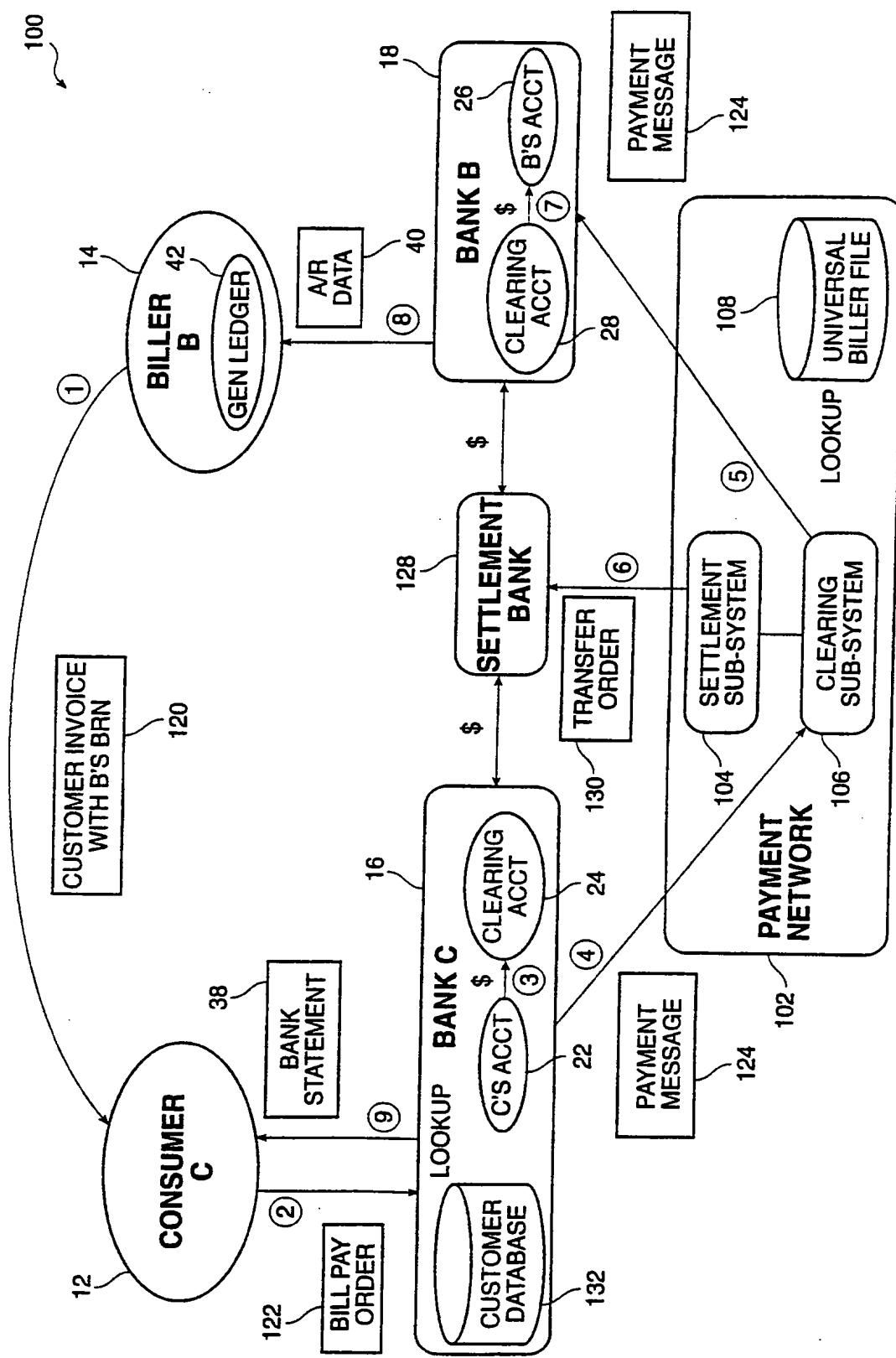


FIG. 4

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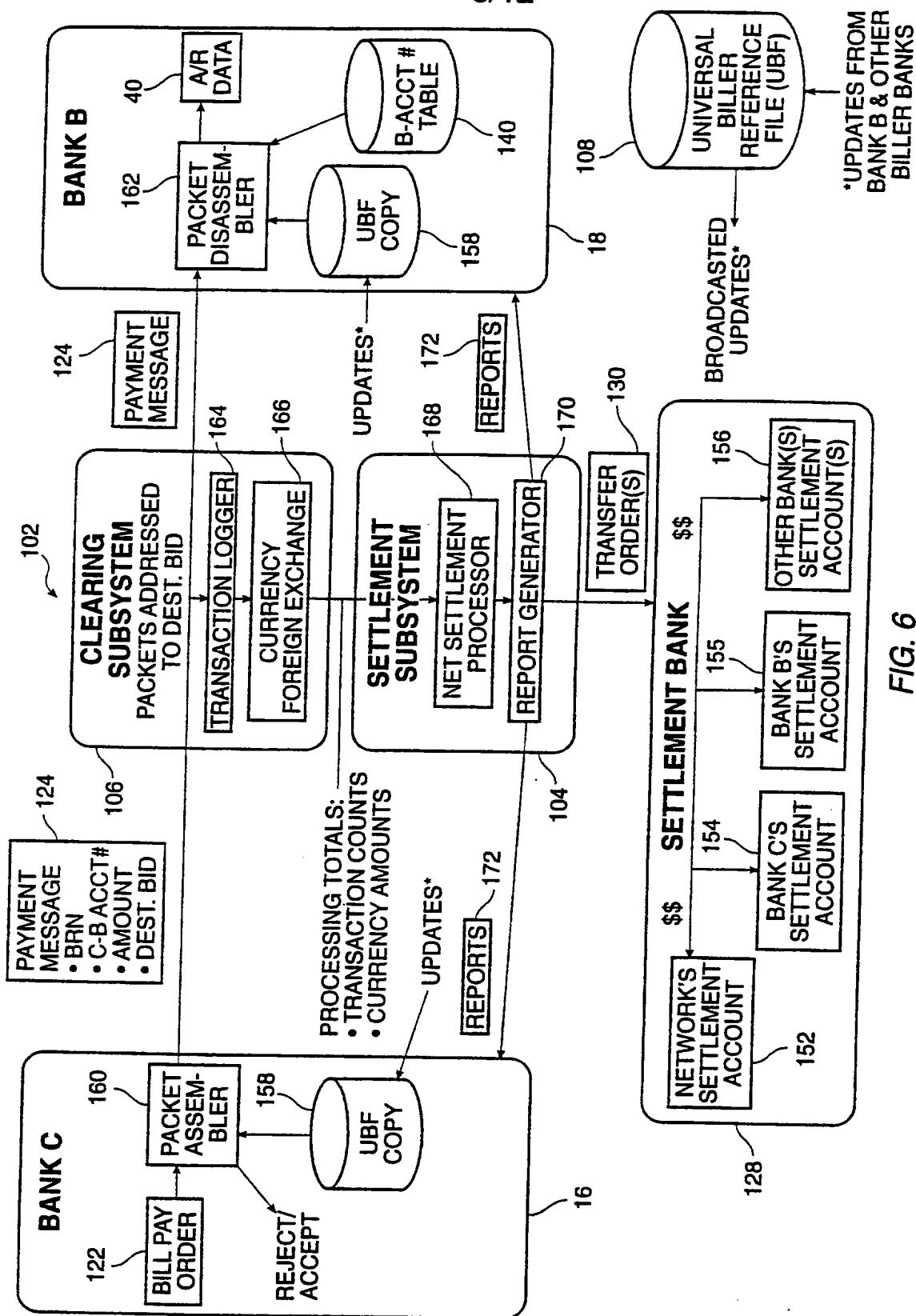
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**FIG. 5**

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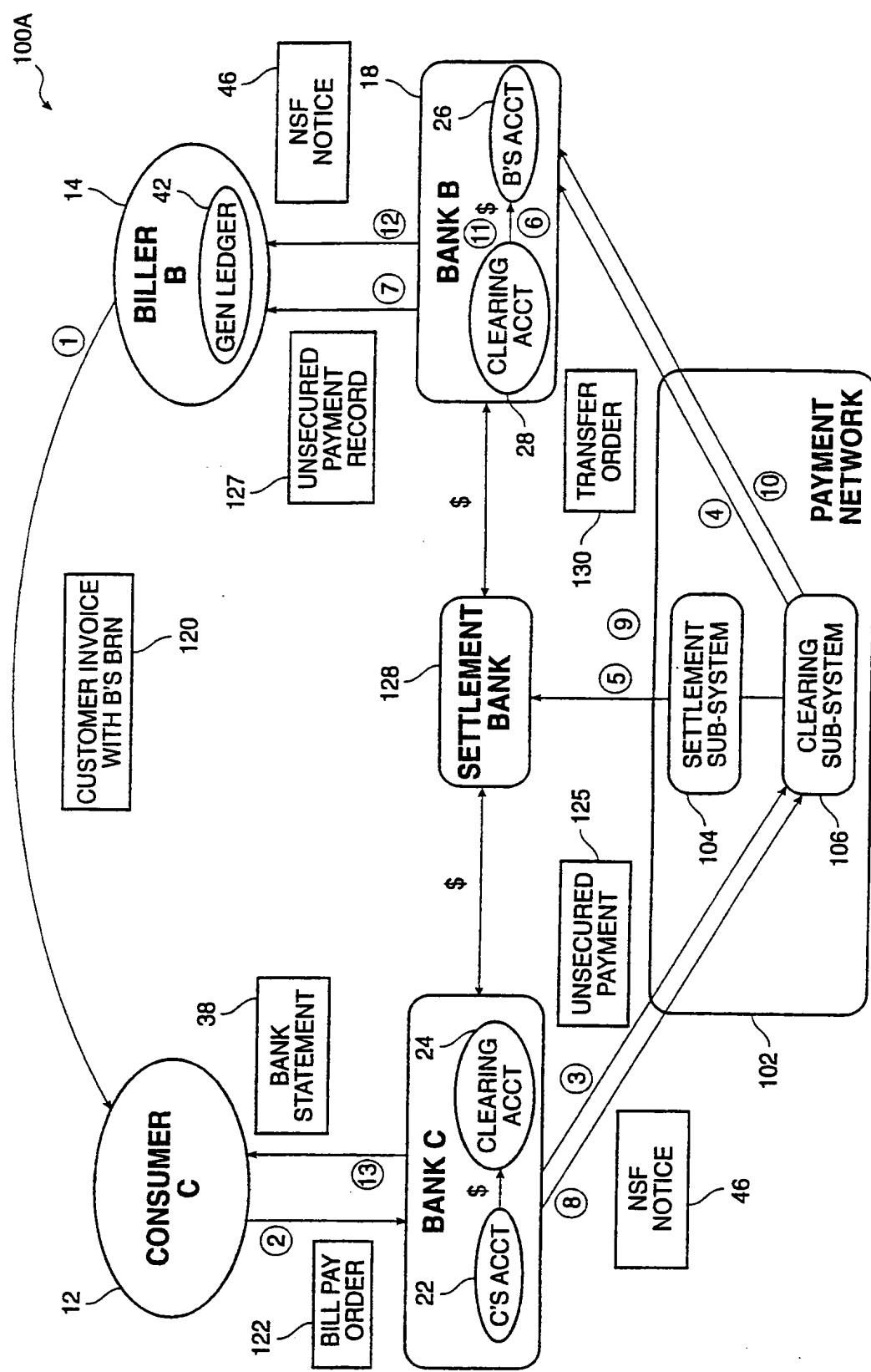


FIG. 7

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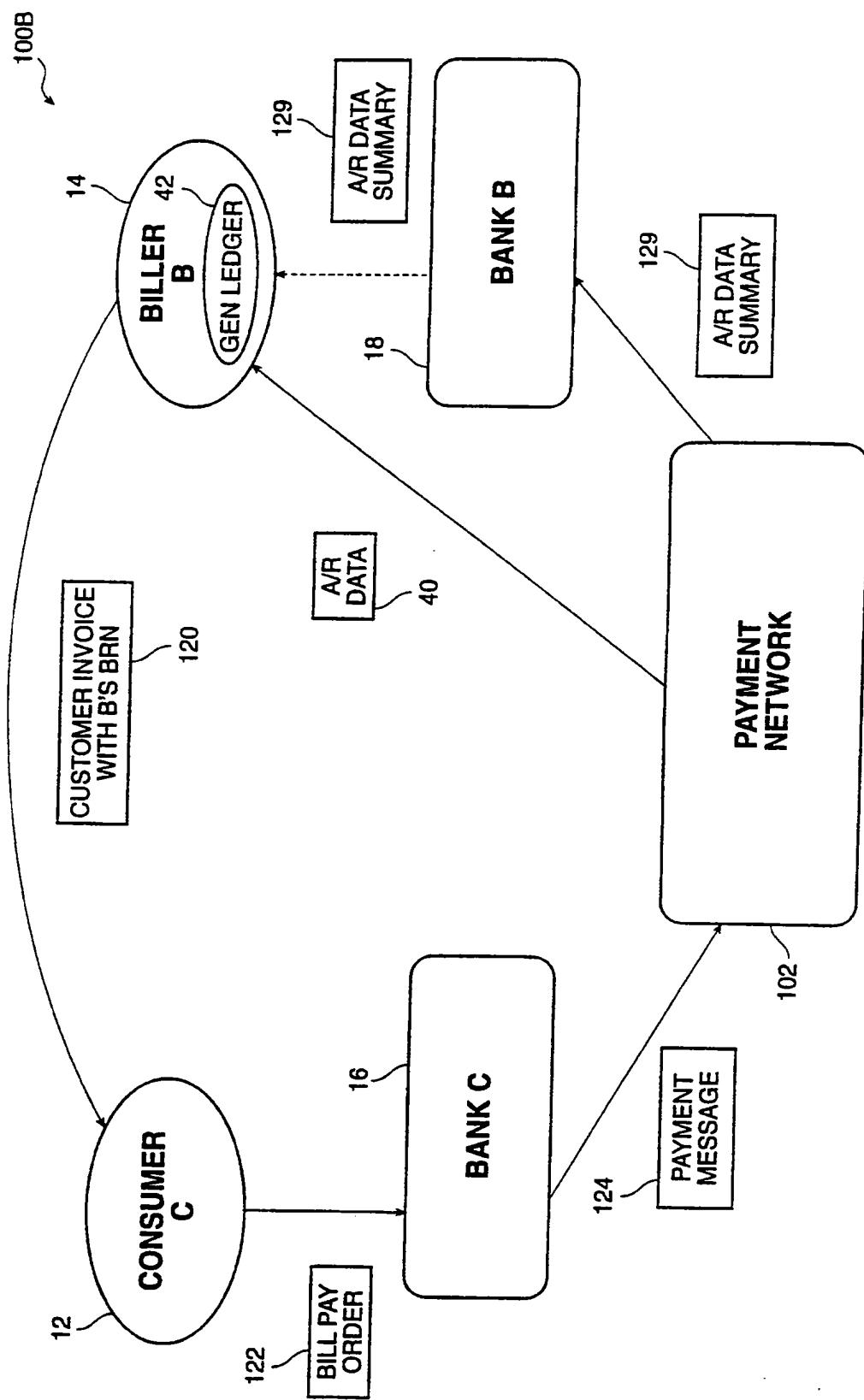


FIG. 8

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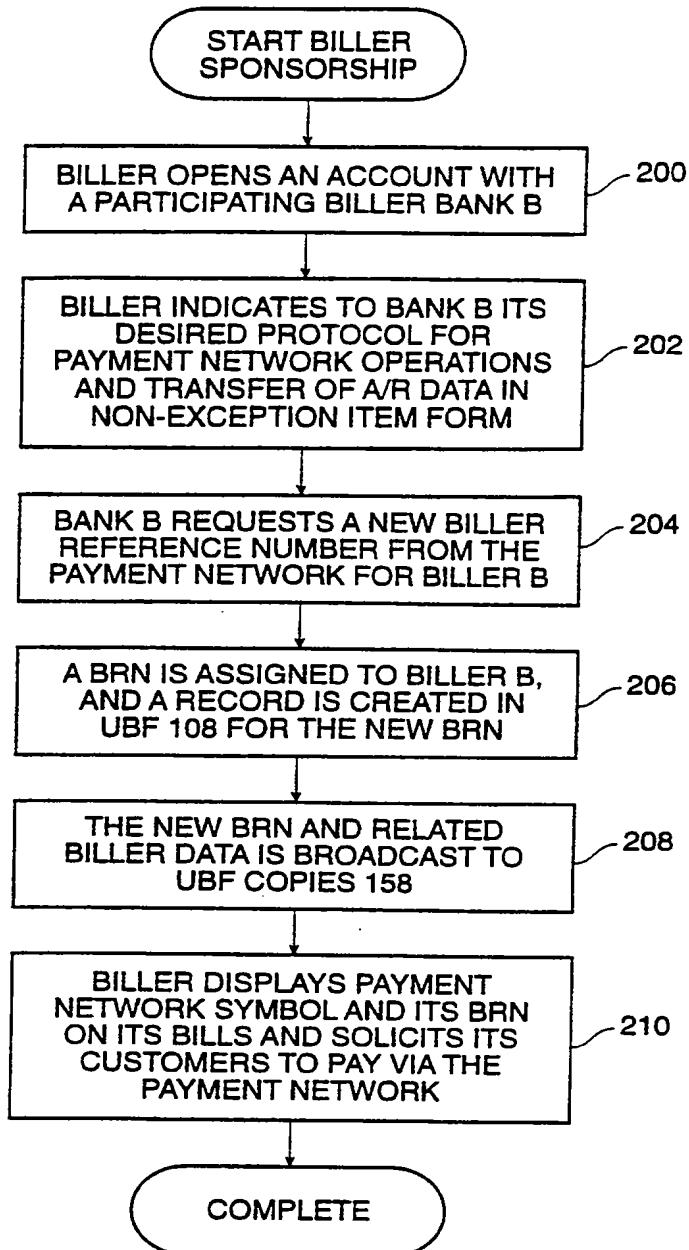


FIG. 9

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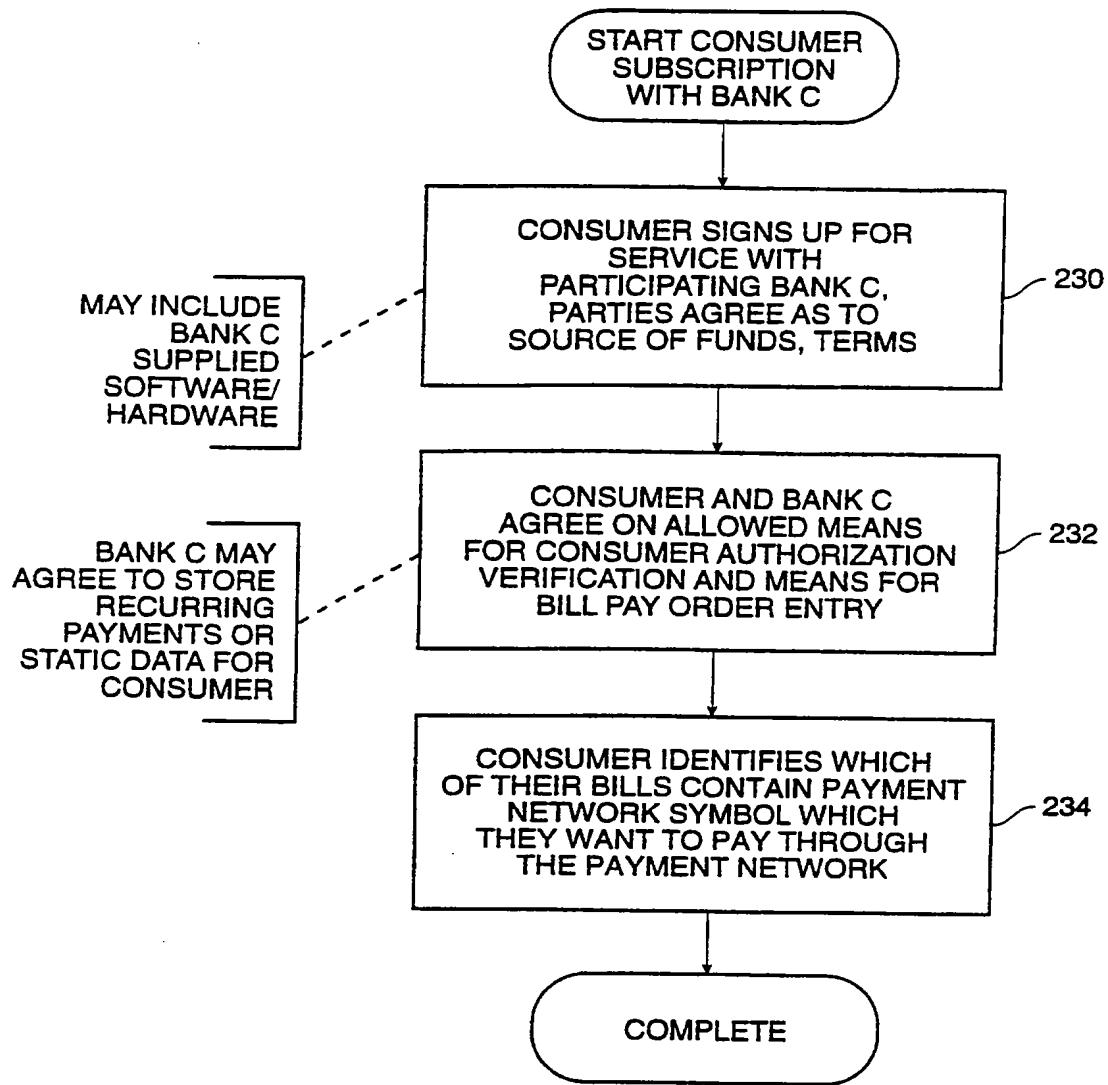


FIG. 10

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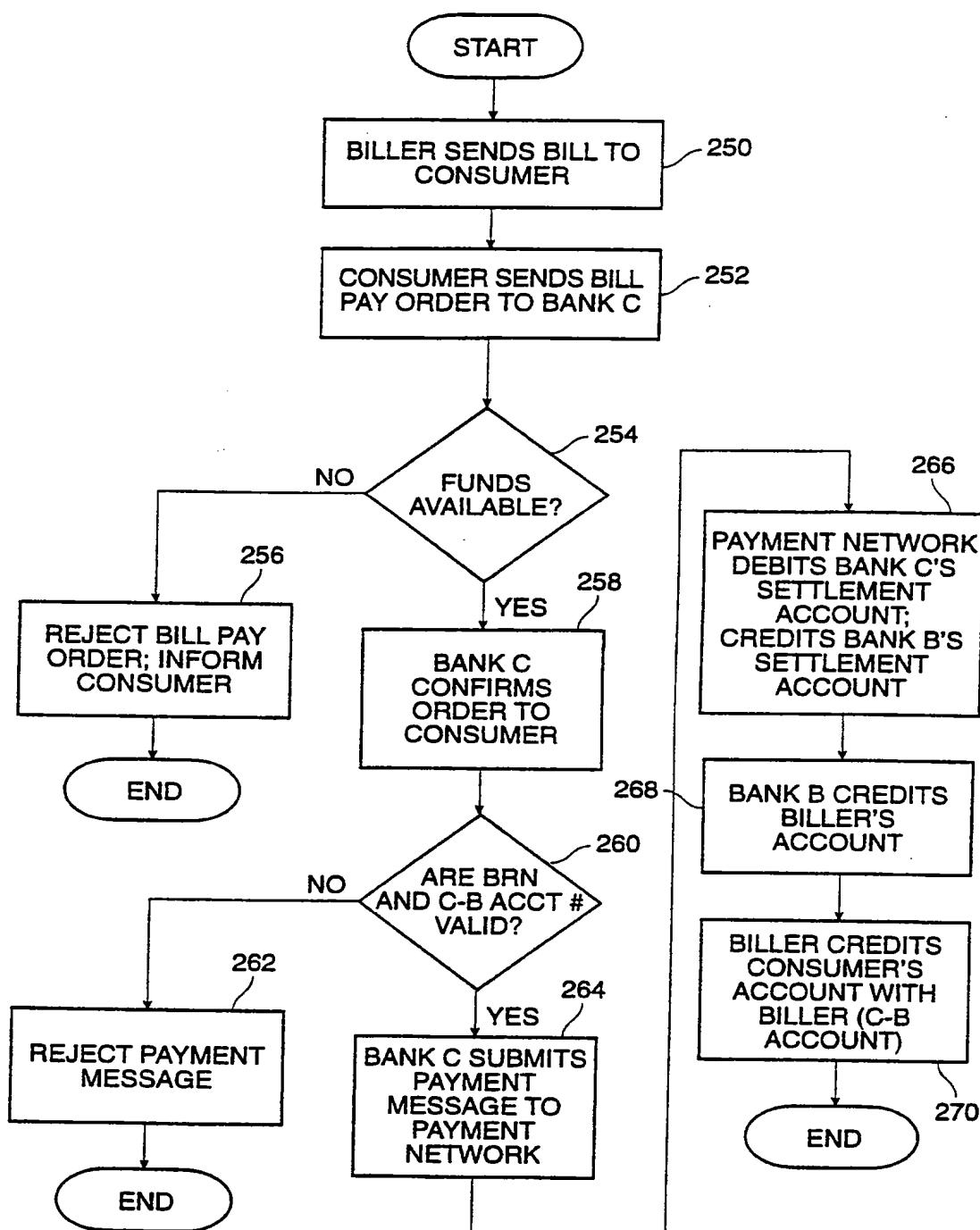


FIG. 11

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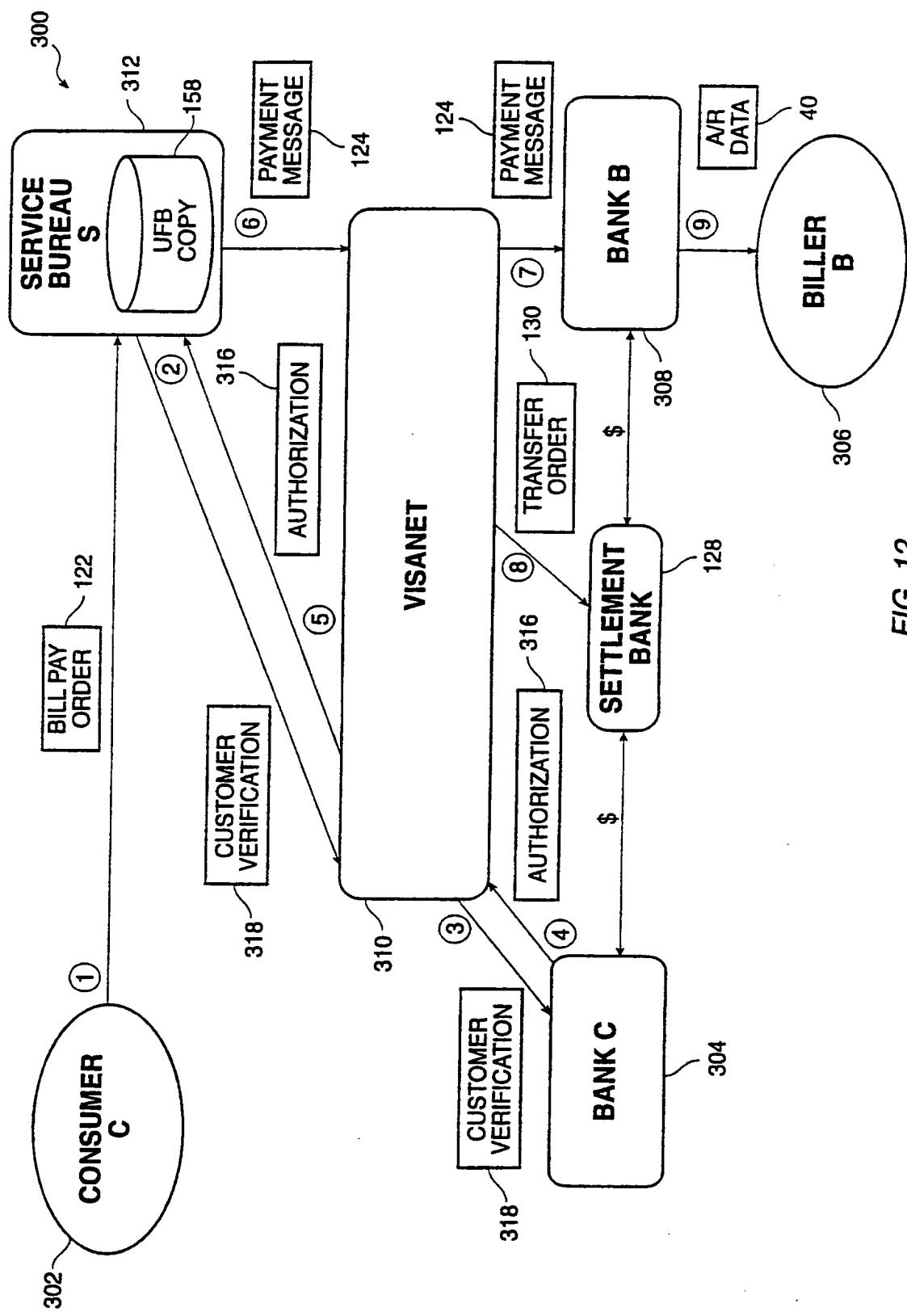


FIG. 12

SUBSTITUTE SHEET (RULE 26)

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US94/11890

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :G06F 157:00

US CL :364/406

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 364/406, 401, 408; 235/379

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 4,270,042 (CASE) 26 May 1981, see abstract and figure 7.	1, 21, 34, 35
Y	US, A, 4,799,156 (SHAVIT ET AL) 17 January 1989, see the entire document, particularly the flowchart figures depicting the transfer of financial and transactions data.	1-35
Y	US, A, 4,823,264 (DEMING) 18 April 1989, see entire document.	1, 21, 33, 35
Y	US, A, 5,093,787 (SIMMONS) 03 March 1992, see in particular figure 6 and its discussion.	1-35
Y	US, A, 5,220,501 (LAWLOR ET AL) 15 June 1993, see entire document, particularly figures 1-3.	1-35

Further documents are listed in the continuation of Box C.  See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be part of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search  01 DECEMBER 1994	Date of mailing of the international search report  20 MAR 1995
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Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer  DONALD McELHENY, JR. <i>D. McElheny</i> Telephone No. (703) 305-3894
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## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US94/11890

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y, P	US, A, 5,283,829 (ANDERSON) 01 February 1994, see entire document, particularly col. 4, lines 53-68, col. 5, lines 1-60.	1-35

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